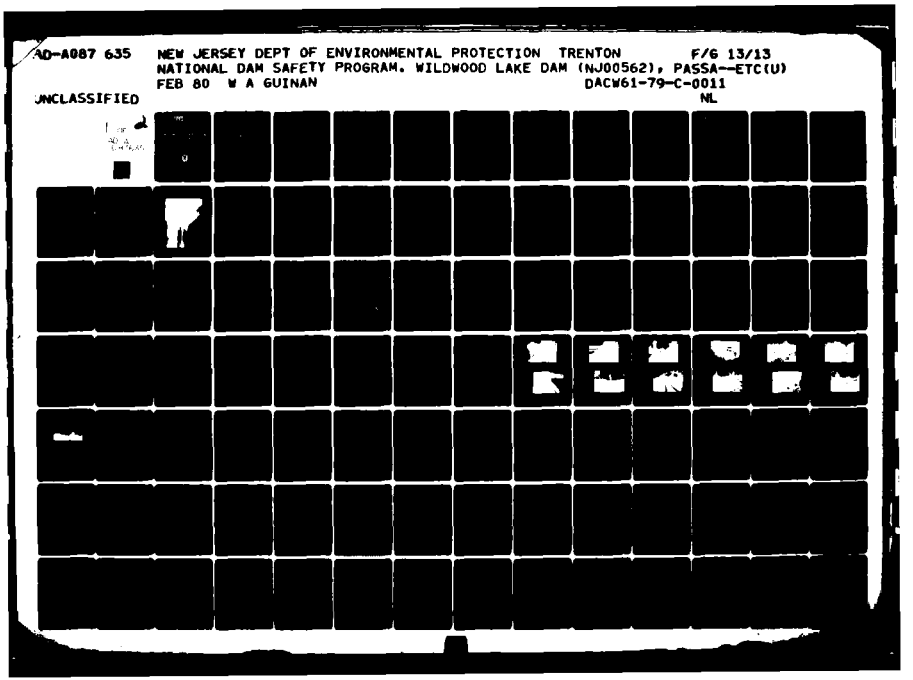
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NATIONAL DAM SAFETY PROGRAM. WILDWOOD LAKE DAM (NJ00562), PASSA--ETC(U)
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LEVEL II

PASSAIC RIVER BASIN
TROY BROOK, MORRIS COUNTY
NEW JERSEY

ADA087635

WILDWOOD LAKE DAM
NJ 00562

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DEPARTMENT OF THE ARMY
Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

FEBRUARY 1980

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10 Warren A. Guinan

REPORT DOCUMENTATION PAGE

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National Dam Safety Program.
Wildwood Lake Dam (NJ00562), Passaic ~~Morris County, N.J.~~ River Basin, Troy Brook, Morris County, New Jersey. Phase I Inspection Report.

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~~6. PERFORMING ORG. REPORT NUMBER~~

7. AUTHOR(s) ~~Warren A. Guinan~~

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Anderson-Nichols
6 London Rd.
Concord, N.H. 03301

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

11. CONTROLLING OFFICE NAME AND ADDRESS

NJ Department of Environmental Protection
Division of Water Resources
P.O. Box CN029
Trenton, NJ 08625

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Approved for public release; distribution unlimited.

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Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dams
Embankments
Structural Analysis
Visual Inspection
National Dam Safety Program
Wildwood Lake Dam, New Jersey
Erosion

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO
NAPEN-N

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

29 JUL 1980

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Wildwood Lake Dam in Morris County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Wildwood Lake Dam, a high hazard potential structure, is judged to be in poor overall condition. Also, the spillway is considered seriously inadequate because a flow equivalent to two percent of the Probable Maximum Flood (PMF) would cause the dam to be overtopped. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard of loss of life downstream from the dam. To ensure adequacy of the structure, the following actions, as a minimum, are recommended.

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Within three months of the consultant's findings, remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. Within six months from the date of approval of this report, engineering studies and analyses should be performed to:

(1). Design or specify repairs for the erosion of the dam embankment next to the concrete spillway structure.

(2). Design or specify repairs for the erosion of the upstream slope of the dam and dike, and design or specify erosion protection for the upstream slope of the dam and dike.

(3). Specify and oversee procedures for removing trees and brush from the dam and dike.

(4). Investigate the cause of the wet area at the toe of the dam near the left abutment and design remedial measures, if needed.

(5). Design and install adequate means to drain the reservoir in case of emergency.

c. The owner should develop written operating procedures and a periodic maintenance plan within one year from the date of approval of this report.

d. Within thirty days from the date of approval of this report, a program should be initiated to check the condition of the dam periodically and monitor the wet area at the toe near the left abutment until remedial measures are effected.

e. The following actions should be completed within six months from the date of approval of this report:

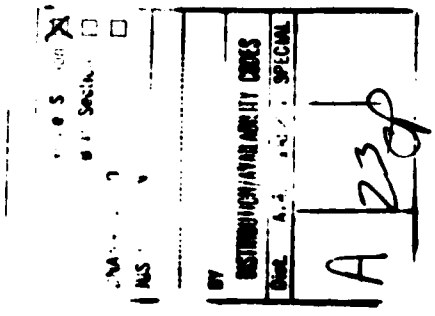
(1). Repair the spalled concrete surface.

(2). Clean and paint rusted steel surfaces.

(3). Control trespassing on the dam to reduce erosion potential.

(4). After repair of eroded areas on the dam and dike, re-establish and maintain grassy vegetation on the dam and dike.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congresswoman Fenwick of the Fifth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.



NAPEN-N
Honorable Brendan T. Byrne

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Copies furnished:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

WILDWOOD LAKE DAM (NJ00562)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 8 November 1979, by Anderson-Nichols and Company, Inc. under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Wildwood Lake Dam, a high hazard potential structure, is judged to be in poor overall condition. Also, the spillway is considered seriously inadequate because a flow equivalent to two percent of the Probable Maximum Flood (PMF) would cause the dam to be overtopped. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard of loss of life downstream from the dam. To ensure adequacy of the structure, the following actions, as a minimum, are recommended.

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Within three months of the consultant's findings, remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. Within six months from the date of approval of this report, engineering studies and analyses should be performed to:

(1). Design or specify repairs for the erosion of the dam embankment next to the concrete spillway structure.

(2). Design or specify repairs for the erosion of the upstream slope of the dam and dike, and design or specify erosion protection for the upstream slope of the dam and dike.

(3). Specify and oversee procedures for removing trees and brush from the dam and dike.

(4). Investigate the cause of the wet area at the toe of the dam near the left abutment and design remedial measures, if needed.

(5). Design and install adequate means to drain the reservoir in case of emergency.

c. The owner should develop written operating procedures and a periodic maintenance plan within one year from the date of approval of the report.

d. Within thirty days from the date of approval of this report, a program should be initiated to check the condition of the dam periodically and monitor the wet area at the toe near the left abutment until remedial measures are effected.

e. The following actions should be completed within six months from the date of approval of this report:

(1). Repair the spalled concrete surface.

(2). Clean and paint rusted steel surfaces.

(3). Control trespassing on the dam to reduce erosion potential.

(4). After repair of eroded areas on the dam and dike, re-establish and maintain grassy vegetation on the dam and dike.

APPROVED: James G. Ton

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: 11 July 1980

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO
NAPEN-N

19 MAY 1980

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, NJ 08621

Dear Governor Byrne:

This is in reference to our ongoing National Program for Inspection of Non-Federal Dams within the State of New Jersey. Wildwood Lake Dam (Federal I.D. No. NJ00562), a high hazard potential structure has recently been inspected. The dam is owned by the Borough of Mountain Lakes and is located on Troy Brook in Mountain Lakes.

Using Corps of Engineers screening criteria, it has been determined that the dam's spillway is seriously inadequate because a flow equivalent to two percent of the Probable Maximum Flood would cause the dam to be overtopped. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise, or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard potential to loss of life downstream from the dam. As a result of this UNSAFE determination, it is recommended that the dam's owner take the following measures within 30 days of the date of this letter:

a. Engage the services of a qualified professional consultant to more accurately determine the spillway adequacy by using more detailed and sophisticated hydrologic and hydraulic analyses, and to recommend any remedial measures required to prevent overtopping of the dam.

b. In the interim, a detailed emergency operation plan and downstream warning system should be promptly developed. Also, around the clock surveillance should be provided during periods of unusually heavy precipitation.

A final report on this Phase I Inspection will be forwarded to you within two months.

Sincerely,

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

Copies Furnished:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

UNSAFE DAM
NATIONAL PROGRAM OF INSPECTION OF DAMS

a. NAME: Wildwood Lake Dam

b. ID NO.: NJ00562

c. LOCATION State: New Jersey, County: Morris.
River or Stream: Troy Brook.
Nearest D/S City or Town: Mountain Lakes.

d. HEIGHT: 11.5 feet

e. MAXIMUM IMPOUNDMENT CAPACITY: 1,065 ac. ft.

f. TYPE: Earthfill and Concrete.

g. OWNER: Borough of Mountain Lakes.

h. DATE GOVERNOR NOTIFIED OF UNSAFE CONDITIONS:

i. CONDITION OF DAM RESULTING IN UNSAFE ASSESSMENT:
Preliminary report calculations indicate 2% of the PMF would overtop the dam.

l. URGENCY CATEGORY: High Hazard, UNSAFE, Non-Emergency.

m. EMERGENCY ACTIONS TAKEN:
Gov. notified of this condition by District Engineer's letter of 19 May 1980

j. DESCRIPTION OF DANGER INVOLVED:
Overtopping and failure of the dam would significantly increase hazard potential to loss of life and property downstream of dam.

n. REMEDIAL ACTIONS TAKEN:
N.J.D.E.P. will notify dam's owner upon receipt of our letter.

k. RECOMMENDATIONS GIVEN TO GOVERNOR:
Within 30 days of the date of the District Engineer's letter the owner should do the following:
a. Engage the services of a qualified professional consultant to more accurately determine the spillway adequacy by using more detailed and sophisticated hydrologic and hydraulic analyses, and to recommend any remedial measures required to prevent overtopping of the dam.
b. In the interim, a detailed emergency operation plan and downstream warning system should be developed. Also, around-the-clock surveillance should be provided during periods of unusually heavy precipitation.

o. REMARKS: Final report, to be issued within six weeks, will have WHITE cover.

T.B. HEVERIN, Coordinator
Dam Inspection Program
U.S.A.E.D., Philadelphia

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Wildwood Lake Dam
Identification No.:	NJ00562
State Located:	New Jersey
Stream:	Troy Brook
River Basin:	Passaic
Date of Inspection:	November 8, 1979

ASSESSMENT OF GENERAL CONDITIONS

Wildwood Lake Dam is an old dam of undetermined age and is in poor overall condition. It is small in size and is classified as high hazard. The upstream slope of the dam is seriously eroded and gullied at the waterline. Bushes are growing on the upstream slope. Near the south abutment the crest of the dam is bare of vegetation. Tree roots, exposed at the surface, cross the entire width of the crest at several locations and there are several footpaths bare of vegetation from the toe to the crest on the downstream slope. There is a minor area that is wet and soft at the downstream toe of the dam a short distance from the north abutment. The embankment is severely eroded adjacent to both sides of the concrete spillway structure. The gate lifting mechanism is rusted and is not operable but can be lifted manually. Some of the concrete surface of the spillway structure is surface eroded exposing the coarse aggregate. The wooden decking covering the structure and the wood stoplogs are weathered. Wildwood Lake Dam spillway and the spillway of Mountain Lake are capable of passing approximately 1 percent of the Probable Maximum Flood (PMF) without causing Wildwood Lake Dam to overtop; dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream over the nonfailure condition; thus, the spillway is judged to be seriously inadequate.

It is recommended that the owner retain the services of a professional engineer, qualified in the design and construction of dams to accomplish the following in the near future: design or specify and oversee repairs for the erosion of the dam embankment next to the concrete spillway structure and the upstream slope of the dam and dike; design or specify and oversee construction of erosion protection for the upstream slope of the dam and dike; specify and oversee procedures for removing trees and brush from the dam and dike; investigate the cause of the wet area near the toe of the north abutment and design remedial measures, if needed; conduct additional detailed hydrologic and hydraulic analyses of Wildwood and Mountain Lake watersheds, reservoirs, connector channels, dams and spillways to determine the need for and type of mitigating measures required. In the future, design and install adequate means to drain the reservoir in case of emergency.

We further recommend that as a part of operating and maintenance procedures, the owner should do the following immediately: start a program of periodically checking the condition of the dam and monitoring the wet area at the toe near the north abutment, clean debris from the upstream end of the outlet pipe. In the near future: repair eroded and spalled concrete surfaces; clean and paint rusted steel surfaces; control trespassing on the dam; re-establish and maintain grassy vegetation on the dam and dike; establish a surveillance program for use during and after periods of heavy rainfall and also a warning program to follow in case of emergency conditions. In the future the owner should engage a professional engineer qualified in design and construction of dams to make a comprehensive technical inspection of the dam once every two years.

ANDERSON-NICHOLS & COMPANY, INC.

Warren A. Guinan

Warren A. Guinan, P.E.
Project Manager
New Jersey No. 16848

OVERVIEW
WILDWOOD LAKE DAM

NOVEMBER 08 1979

CONTENTS
PHASE I INSPECTION REPORT
WILDWOOD LAKE DAM N.J. NO. 25-56 FED ID NO. NJ00562

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY INSPECTION PROGRAM
WILDWOOD LAKE DAM
#NJ00562

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. Authority to perform the Phase I Safety Inspection of Wildwood Lake Dam was received from the State of New Jersey, Department of Environmental Protection, Division of Water Resources by letter dated 26 October 1979 under Contract FPM No. 39, dated 28 June 1979. This authority was given pursuant to the National Dam Inspection Act, Public Law 92-367 and by agreement between the State and the U.S. Army Engineers District, Philadelphia. The inspection discussed herein was performed by Anderson-Nichols & Company, Inc. on 7 November 1979.

b. Purpose. The purpose of the Phase I Investigation is to develop an assessment of the general conditions with respect to safety of Wildwood Lake Dam and appurtenances based upon available data and visual inspection, and determine any need for emergency measures and conclude if additional studies, investigations, and analyses are necessary and warranted.

1.2 Project Description

a. Description of Dam and Appurtenances. Wildwood Lake Dam is an old (construction date unknown) earthfill dam, which is approximately 745 feet long, has a structural height of 13 feet and hydraulic height of 11.5 feet. The topwidth of the dam varies from 4 feet to 13 feet. The downstream face slopes at approximately 2.5H:1V. The upstream face drops vertically for 2 feet and then slopes at 5H:1V. A 1.5 foot wide concrete core is visible in the vicinity of the spillway structure and the north end of the dam, however there is no indication of core existence through the total length of the dam. Concrete wingwalls 6.6 feet long and at 45 degree angles contract the flow to the 13.5 foot long inlet box. Concrete spillway abutments, 1 foot thick, define the 3.4 foot wide spillway opening. The top of the spillway structure is covered with wooden decking. The upstream opening is limited by 3 inch thick wooden stoplogs. Seven feet downstream of the stoplogs, a 2.5 foot x 3.4 foot steel gate restricts the opening of the structure. From the inlet structure,flow is discharged through a 1.8 foot diameter RCP pipe down the face of the dam and beneath a road. The outlet of the culvert is located 460 feet downstream of the spillway. A dike, approximately 3 feet high, is located at the northeast end of the lake with a minimum elevation of 491.5 feet NGVD. Essential features of the dam are shown in Figure 1. At the southwest end of Wildwood Lake a connector channel leads to Mountain Lake. The channel is well defined, approximately 20 feet wide and is spanned by 3 bridges.

The gradient of the channel is flat, or nearl .t, and allows for free flow of water between the two lakes. Essential features of Mountain Lake are described in the Mountain Lake Dam, NJ00284, Phase I Inspection Report. The watershed above these two lakes is gently to moderately sloping and primarily residential. Three tandem impoundments, Birchwood Lake, Crystal Lake, and Sunset Lake occupy the upper portion of the drainage area.

b. Location. The dam is located in the Borough of Mountain Lakes, Morris County, New Jersey, on Troy Brook. It has coordinates north latitude 40° 53.6' and west longitude 74° 26'. A location map is shown in Figure 2.

c. Size Classification. Wildwood Lake Dam is classified as being small in size, as defined in the Recommended Guidelines for Safety Inspection of Dams, on the basis of its storage, volume at the dam crest of 161 acre-feet (Mountain Lake not included) which is less than 1,000 acre-feet, but more than 50 acre-feet, and its hydraulic height of 11.5 feet which is less than 40 feet. For the hydraulic analysis, Wildwood Lake and Mountain Lake are treated as one reservoir for storage routing. From the visual inspection of the channel connecting these two lakes, it is clear that flow will pass between the lakes at high discharges but a breach of one of the dams would not completely drain the other reservoir.

d. Hazard Classification. A residential street parallels the dam about 30 feet from the toe and a grade school building is located about 250 feet downstream. A failure of the dam could clearly cause a high hazard to loss of life. The failure could also cause excessive property damage to the road, school building, and school parking lot. Wildwood Lake Dam is thus classified as High Hazard.

e. Ownership. Wildwood Lake Dam is owned by the Borough of Mountain Lakes. Mr. Carl Danser, Superintendent of Public Works (334-3131) was contacted for information.

f. Purpose of Dam. The reservoir is surrounded by residential development and is used for recreational purposes.

g. Design and Construction History. No plans, hydraulic or hydrologic data for the original construction were found.

h. Normal Operational Procedures. No formal operational procedures were found.

i. Site Geology. No site specific geologic information (such as borings) was available at the time the dam was inspected. Information derived from a report entitled "Engineering Geology of the Northeast Corridor, Washington, DC to Boston, MA" and the Geologic Map of New Jersey (Lewis and Kummel, 1912) indicate that soils within the immediate site area consist of till grading laterally to sand and gravel. These soils form a nearly continuous band which is believed to be an end moraine for the last continental glaciation. Although no outcrops were observed during inspection of

this dam, the previously mentioned report indicates that the underlying bedrock consists of granitoid gneiss with associated migmatite, granulite, amphibolite, and granitic rocks of Precambrian age.

1.3 Pertinent Data

a. Drainage Area - 1.27 square miles

b. Discharge at Damsite - cfs

Maximum flood at damsite - unknown

Gated spillway capacity at normal pool elevation with stoplog in place (as during inspection) -

Wildwood Lake - .4±

Mountain Lake - 0.0

Gated spillway capacity at maximum pool (top of dam) elevation -

Wildwood Lake - 14.5

Mountain Lake - 35.1

Total discharge capacity at crest of Wildwood Lake Dam - 50

c. Elevation (ft. above NGVD)

Top of dam -

Wildwood Lake - 491.5

Mountain Lake - 492.3

Top of northeast dike - 491.5

Maximum pool - design surcharge (PMF) - 493.5

Recreation pool (during inspection) - 489.1

Spillway crest (gated) - 489.0 (stoplogs)

Streambed at the outlet of the culvert - 466.4

Maximum tailwater (estimated) - 470.2

d. Reservoir

Length of maximum pool - 1530 feet (Mountain Lake not included)

Length of recreational pool - 1500 feet (" " " ")

e. Storage (acre-feet)

Recreational pool -

Wildwood Lake - 120

Mountain Lake included - 835

Design surcharge (PMF) -

Wildwood Lake - 197

Mountain Lake included - 1260

Top of dam -

Wildwood Lake - 161

Mountain Lake included - 1065

f. Reservoir Surface (acres)

Top of Wildwood Lake Dam -

Wildwood Lake - 16.3

Mountain Lake included - 92.1

Recreational pool -

Wildwood Lake - 16.0

Mountain Lake included - 91.3

Spillway crest -

Wildwood Lake - 16.0

Mountain Lake included - 91.3

g. Dam

Type - earthfill (length of concrete core is uncertain)

Length - 745 feet

Height - hydraulic - 11.5 feet

- structural - 13.0 feet

Topwidth - 4 to 13 feet

Side slopes - upstream - 2 feet vertical, then 5H:1V

- downstream - 2.5H:1V

Zoning - unknown

Impervious core - concrete 1.5 feet thick of uncertain length

Cutoff - unknown

Grout curtain - unknown

h. Spillway

Type - stoplog

Length of weir - 3.4 feet

Crest elevation - 489 feet above NGVD (with stoplogs in place as during inspection)

Gates - steel plate 2.5' x 3.4'

Upstream channel - Wildwood Lake

Downstream channel - brook of unknown name

SECTION 2
ENGINEERING DATA

2.1 Design

No engineering design data or plans were found.

2.2 Construction

No original construction data were found.

2.3 Operation

No engineering operational data were found.

2.4 Evaluation

a. Availability. A search of the New Jersey Department of Environmental Protection files and contact with the owner and community officials revealed no recorded information.

b. Adequacy. Because no recorded information was found, the evaluation of this dam was based solely on visual observations.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. Dam. The upstream slope of the dam is seriously eroded and gullied at the waterline. There are scattered boulders on the upstream slope. They may be remnants of riprap, but are not now effective in preventing erosion of the upstream slope. Bushes are growing on the upstream slope. The crest of the dam is bare of vegetation across its entire width near the south abutment, and there is a footpath bare of vegetation over much of the rest of the length of the crest. Tree roots, exposed at the surface, cross the entire width of the crest at several locations. The crest is somewhat uneven. Trees up to 2 feet in diameter and brush cover the entire downstream slope, and a pile of cut brush has been dumped on the downstream slope a short distance from the north abutment. At several locations there are footpaths bare of vegetation from the toe to the crest on the downstream slope. The embankment is severely eroded adjacent to both sides of the concrete spillway structure. There is a minor area that is wet and soft at the downstream toe of the dam a short distance from the north abutment.

b. Appurtenant Structures.

1. Concrete outlet works: some of the concrete surface area is surface eroded exposing the coarse aggregate; the surface of the steel gate structure is rusted; the gate lifting mechanism is not operable but can be lifted manually; the wooden decking and wood stoplogs were observed to be weathered. There is some debris in the upstream end of the outlet works discharge pipe.

2. There is an earth dike at the northeast end of the lake. The upstream slope has experienced some erosion at the waterline. There is one small clump of brush growing on the upstream slope. A few trees are growing on the downstream slope and near the downstream toe of the dike.

c. Reservoir Area. The intermediate drainage area of Wildwood Lake and of Mountain Lake is moderately sloping and primarily residential. The drainage area farther upstream, above Sunset, Crystal, and Birchwood Lakes, is also moderately sloping but is mostly wooded. Slopes adjacent to the lake appear to be stable. No evidence of significant sedimentation was observed.

d. Downstream Channel. The spillway outlet pipe appears to pass beneath the school below the dam. Several catch basins may be tied in. Some small trees and brush overhang the discharge channel downstream of the spillway outlet pipe, which is several hundred feet downstream of the dam.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

No formal operating procedures were found.

4.2 Maintenance of Dam

No formal maintenance procedures for the dam were revealed.

4.3 Maintenance of Operating Facilities

No formal maintenance procedures for the operating facilities were revealed.

4.4 Warning System

No description of any warning system was found.

4.5 Evaluation of Operational Adequacy

Because of the lack of operation and maintenance procedures the remedial measures described in Section 7.2 should be implemented as prescribed.

SECTION 5
HYDROLOGIC/HYDRAULIC

5.1 Evaluation of Features

a. Design Data. No hydrologic or hydraulic design data were obtained.

b. Experience Data. According to a local resident, Mrs. Buyski, the northeast dike was slightly overtopped in 1972. The top of the dike and the top of the dam are at approximately the same elevation, which would indicate that the dam may have also been slightly overtopped. However, Mrs. Buyski did not recall any instances of flow over the dam.

c. Visual Observation. No visible evidence of damage to the structure caused by overtopping was observed. There was a minor area that was wet and soft at the downstream toe of the dam a short distance from the north abutment. At the time of inspection about .4 cfs of water was flowing over the stoplogs.

d. Overtopping Potential. The hydraulic/hydrologic evaluation for Wildwood Lake is based on a Spillway Design Flood (SDF) equal to the Probable Maximum Flood (PMF) in accordance with the range of test floods given in the evaluation guidelines for dams classified as High Hazard and small in size. The PMF has been determined by application of the SCS Dimensionless Unit Hydrograph procedure to a 6-hour PMP storm of 25.5 inches. Wildwood Lake and Mountain Lake were treated as one reservoir to develop the storage-discharge relationship. The inflow hydrograph from the intermediate drainage area was added to routed outflow from Sunset Lake to develop the total inflow hydrograph. Hydrologic computations are given in Appendix 3. The routed PMF peak discharge for the subject watershed is approximately 5700 cfs. Of this approximately 3500 cfs passes through the spillway and over the Wildwood Lake Dam and approximately 1250 cfs passes over the northeast dike. The remaining 920 cfs passes through and over Mountain Lake Dam. The minimum elevation of Wildwood Lake Dam allows 2.5 feet of depth above the stoplogs before overtopping begins. Under this head the spillway capacity of Wildwood Lake Dam is 14.5 cfs. Under this same head the Mountain Lake Dam is discharging 35.1 cfs.

Assuming that it does not fail, routing calculations indicate that Wildwood Lake Dam will be overtopped for almost 5 hours to a maximum depth of 2 feet under PMF conditions. It is estimated that the Wildwood Lake Spillway and Mountain Lake spillway can pass approximately 1% of the PMF without causing Wildwood Lake Dam to overtop. Because the dam is high hazard, cannot pass 50 percent of the PMF without overtopping and probable failure, and the hazard to loss of life downstream would be significantly increased with overtopping failure, the spillway of Wildwood Lake Dam is judged to be seriously inadequate.

SECTION 6
STRUCTURAL STABILITY

6.1 Visual Observations.

Erosion of the upstream slope of the dam at the waterline and serious erosion adjacent to the concrete spillway structure, if allowed to continue, could result in eventual breaching of the embankment. Parts of the crest of the dam which are bare of vegetation would be susceptible to erosion if the dam were overtopped, which might, in turn, lead to breaching of the dam. Trees growing on the downstream slope, and brush which may eventually attain tree size on both the downstream and upstream slopes, may cause seepage and erosion problems if a tree blows over and pulls out its roots, or if a tree dies or is cut and its roots rot. Footpaths, which are bare of vegetation, on the downstream slope, are susceptible to erosion by rainfall or by overtopping of the dam, and the erosion, could, in turn, lead to breaching of the dam. A wet, soft area near the left abutment may develop into a significant seepage and erosion problem if not controlled. Erosion of the upstream slope of the dike, if allowed to continue, could result in eventual breaching of the dike. Trees growing on the downstream slope of the dike and near the downstream toe of the dike, and brush which may eventually attain tree size on the upstream and downstream slopes, may cause seepage and erosion problems if a tree blows over and pulls out its roots, or if a tree dies or is cut and its roots rot.

6.2 Design and Construction Data.

No design or construction data pertinent to the structural stability of the dam are available.

6.3 Operating Records.

No operating records pertinent to the structural stability of the dam are available.

6.5 Post-Construction Changes.

No record of post-construction changes pertinent to the structural stability of the dam is available.

6.5 Seismic Stability

This dam is in Seismic Zone 1. According to the Recommended Guidelines, dams located in Seismic Zone 1 "may be assumed to present no hazard from earthquake provided static stability conditions are satisfactory and conventional safety margins exist." None of the visual observations made during the inspection are indicative of unstable slopes. However, because no data are available concerning the engineering properties of the embankment and foundation materials for this dam, it is not possible to make an engineering evaluation of the stability of the slopes or the factor of safety under static conditions.

SECTION 7
ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. Wildwood Lake Dam is an old structure of undetermined age and is in poor condition.

b. Adequacy of Information. The information available is such that the assessment of the dam must be based primarily on the results of the visual inspection.

c. Urgency. The recommendations made in 7.2 should be implemented by the owner as prescribed below.

d. Necessity for Additional Data/Evaluation. The information available from the visual inspection is adequate to identify the potential problems which are listed in 7.2 a. These problems require the attention of a professional engineer who will have to make additional studies to design or specify remedial measures to rectify the problems. If left unattended, the problems could lead to instability of the structure.

7.2 Recommendations/Remedial Measures

a. Recommendations. The owner should retain a professional engineer qualified in the design and construction of dams to accomplish the following in the near future:

1. Design or specify repairs for the erosion of the dam embankment next to the concrete spillway structure.

2. Design or specify repairs for the erosion of the upstream slope of the dam and dike, and design or specify erosion protection for the upstream slope of the dam and dike.

3. Specify and oversee procedures for removing trees and brush from the dam and dike.

4. Investigate the cause of the wet area at the toe of the dam near the left abutment and design remedial measures, if needed.

5. Conduct additional detailed hydrologic and hydraulic analyses of the Mountain and Wildwood Lake watersheds, reservoirs, connector channel, dams and spillways to determine the need for and type of mitigating measures required.

In the future: design and install adequate means to drain the reservoir in case of emergency.

b. Operating and Maintenance Procedures. The owner should do the following immediately:

1. Start a program of periodically checking the condition of the dam and monitoring the wet area at the toe near the left abutment.

2. Clean debris from upstream end of outlet pipe.

The owner should do the following in the near future:

1. Repair eroded and spalled concrete surface.

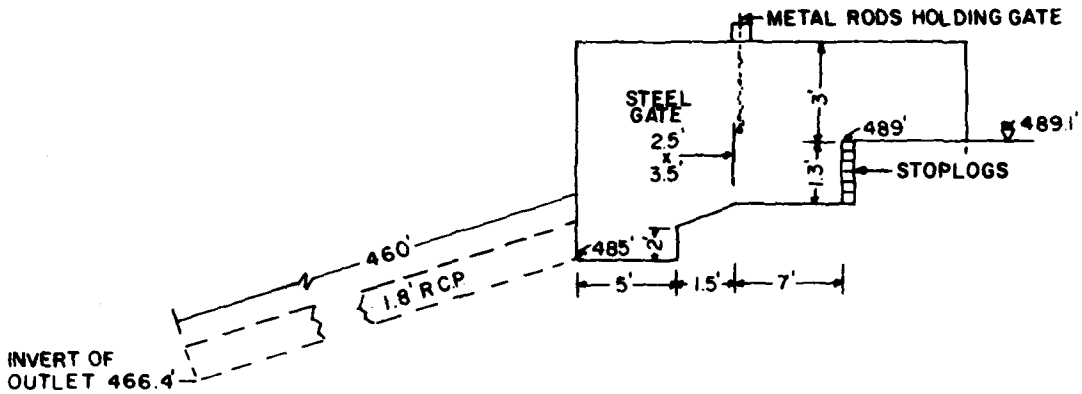
2. Clean and paint rusted steel surfaces.

3. Control trespassing on the dam to reduce erosion.

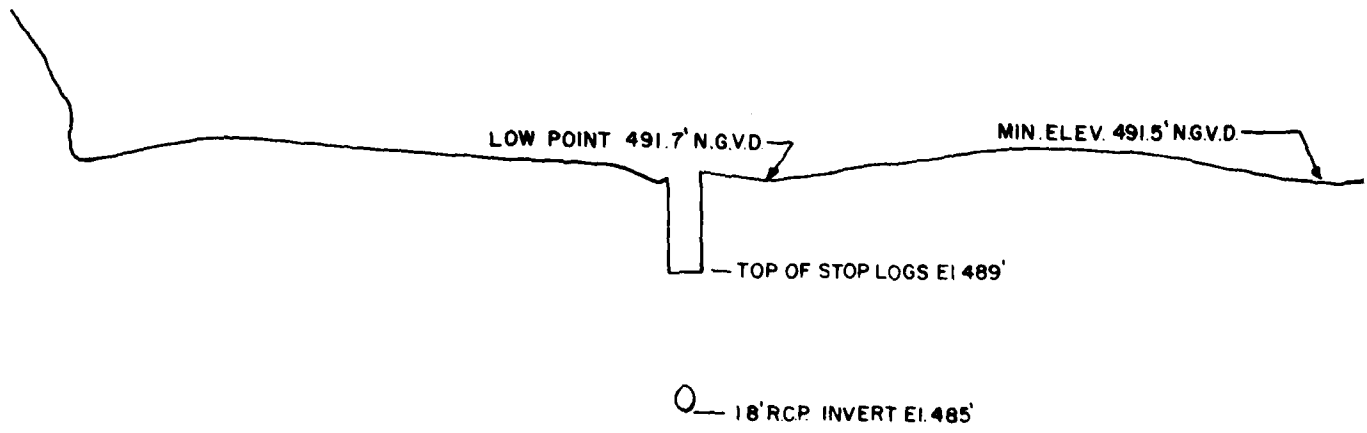
4. After repair of eroded areas on the dam and dike, re-establish and maintain grassy vegetation on the dam and dike.

5. Establish a surveillance program for use during and after periods of heavy rainfall, and also a warning program to follow in case of emergency conditions.

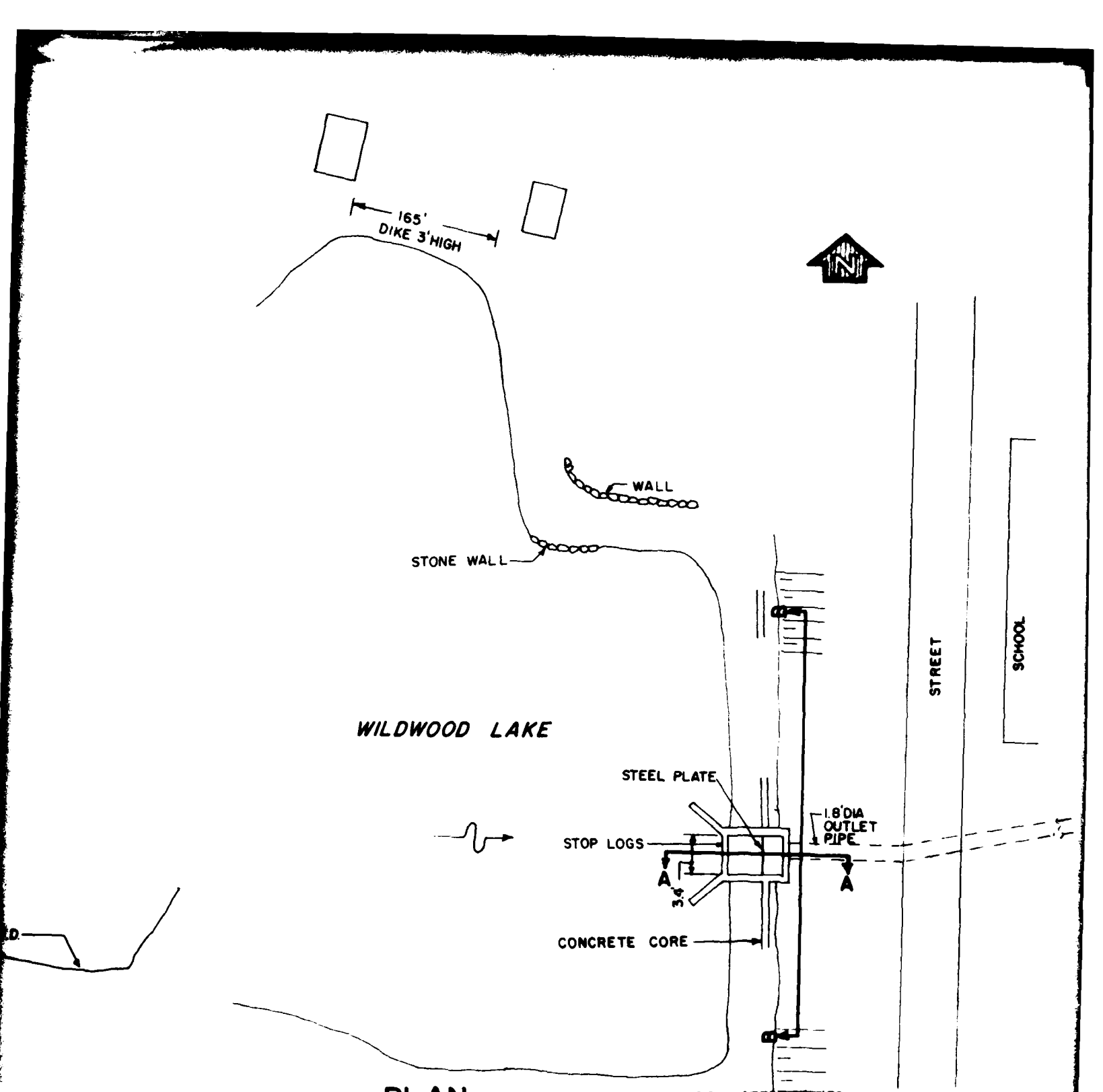
Within one year from the date of approval of this report, the owner should develop written operating procedures and a periodic maintenance plan to insure the safety of the dam.



SECTION A-A



ELEVATION B-B



PLAN

DRAWN FROM FIELD INSPECTION NOTES 11/8/79

Anderson-Nichols & Co., Inc CONCORD NEW HAMPSHIRE	U.S. ARMY ENGINEER DIST. PHILADELPHIA CORPS OF ENGINEERS PHILADELPHIA, PA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

WILDWOOD LAKE DAM

TROY BROOK NEW JERSEY

SCALE: NOT TO SCALE

DATE: JANUARY 1980

FIGURE

1 2

Anderson-Nichols & Co., Inc.	U.S. ARMY ENGINEER DIST. PHILADELPHIA
CONCORD NEW HAMPSHIRE	CORPS OF ENGINEERS PHILADELPHIA, PA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

WILDWOOD LAKE DAM
LOCATION MAP

TROY BROOK NEW JERSEY

SCALE: SEE BAR SCALE

DATE: JANUARY 1980

SCALE IN MILES

0 5 10

MAP BASED ON STATE OF NEW JERSEY OFFICIAL HIGHWAY MAP AND GUIDE.

APPENDIX 1

CHECKLIST
VISUAL INSPECTION

WILDWOOD LAKE DAM

Check List
Visual Inspection
Phase 1

Name Dam Wildwood Lake Dam County Morris State NJ Coordinators NJDEP

Date(s) Inspection Nov. 8, 1979 Weather Cloudy, cool Temperature 55° F

Pool Elevation at Time of Inspection 489.1 ft. NGVD Tailwater at Time of Inspection 467 ft. NGVD

Inspection Personnel:

Warren Guinan — Ronald Hirschfeld

Stephen Gilman

Janusz Czyzowski

Gilman & Hirschfeld Recorder

Carl Danser, Superintendent of Public Works for the Borough of Mountain Lakes was present during inspection.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Very severe erosion of upstream slope at waterline and gullying of upstream slope. Minor erosion of footpaths on downstream slope.	Upstream slope should be thoroughly rehabilitated or rebuilt.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Crest is uneven.	No action required.
RIPRAP FAILURES	From right abutment to spillway there are scattered boulders at waterline but there appears to be no riprap. From spillway to left abutment there appear to be remnants of riprap but it is in very poor condition.	See recommendation under "Sloughing or Erosion..." above.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
RAILINGS	No railings.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Severe erosion of embankment on both sides of spillway structure.	Repair eroded areas and establish grassy vegetation.
ANY NOTICEABLE SEEPAGE	Small wet area on downstream slope near left abutment.	Investigate the cause, design and implement appropriate remedial measures if required.
STAFF GAGE AND RECORDER	None observed.	
DRAINS	None observed.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Concrete sill not visible Abutments - concrete is surface eroded to expose coarse aggregate. Some spalled areas where in contact with water.	Repair spalled concrete areas.
APPROACH CHANNEL	Wide and unobstructed.	
DISCHARGE CHANNEL	Channel downstream of outlet of spillway discharge pipe is bouldery. Some trees overhang channel.	Condition of channel downstream of outlet pipe will likely not affect spillway performance.
BRIDGE AND PIERS	Wood deck is weathered and steel plates are rusted. Some rust observed on railings.	
GATES AND OPERATION EQUIPMENT	Steel plate is rusted. Operating mechanism is not operable, but gate is manually lifted. Slots are also rusted. Stoplogs were observed to be weathered. Some debris was noted in the upstream end of the discharge pipe.	Clean and paint rusted steel. Remove debris from outlet structure.

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None observed.	
OBSERVATION WELLS	None observed.	
WEIRS	None observed.	
PIEZOMETERS	None observed.	
OTHER	None observed.	

DIKE EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Some erosion of upstream slope at the normal waterline.	Provide appropriate slope protection.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Good.	
RIPRAP FAILURES	No riprap.	Provide appropriate slope protection.

DIKE EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
RAILINGS	None.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No spillway.	
ANY NOTICEABLE SEEPAGE	None.	
STAFF GAGE AND RECORDER	None.	
DRAINS	None.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Gently sloping. No signs of instability observed.	
SEDIMENTATION	No evidence of significant sedimentation observed.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	460 feet long. 1.8 feet diameter underground pipe - condition unknown.	
SLOPES	For distance approximately 460 feet concrete pipe (1.8' diameter) slope - .04	
APPROXIMATE NO. OF HOMES AND POPULATION.	A residential street parallels the dam about 30 feet from the toe. A grade school building and school parking lot are located about 250 feet directly downstream of the dam.	Failure of the dam could clearly cause a high hazard to loss of life.

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	No original plans were disclosed, plans for this report were developed from visual inspection.
REGIONAL VICINITY MAP	Prepared for this report.
CONSTRUCTION HISTORY	None disclosed.
TYPICAL SECTIONS OF DAM	Prepared for this report from visual inspection.
HYDROLOGIC/HYDRAULIC DATA	None disclosed.
OUTLETS - PLAN	None disclosed.
- DETAILS	None disclosed.
- CONSTRAINTS	None disclosed.
- DISCHARGE RATINGS	None disclosed.
RAINFALL/RESERVOIR RECORDS	None disclosed.

ITEM	REMARKS
DESIGN REPORTS	None disclosed.
GEOLOGY REPORTS	None disclosed.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None disclosed.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None disclosed.
POST-CONSTRUCTION SURVEYS OF DAM	None disclosed.
BORROW SOURCES	Unknown

ITEM	REMARKS
MONITORING SERVICES	Unknown
MODIFICATIONS	None disclosed.
HIGH POOL RECORDS	None disclosed.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None disclosed.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None disclosed.
MAINTENANCE OPERATION RECORDS	None disclosed.

ITEM	REMARKS
SPILLWAY PLAN	No original plans were disclosed.
SECTIONS	Cross section for this report was prepared from visual inspection.
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	None

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 1.27 square miles, gently/moderately sloping

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 489.1 ft. NGVD (120 ac-ft) (Wildwood Lake only)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): Not applicable

ELEVATION MAXIMUM DESIGN POOL: 493.5 ft. NGVD (PMF)

ELEVATION TOP DAM: 491.5 ft. NGVD

SPILLWAY: stoplog section

a. Elevation 489. ft. NGVD

b. Type stoplog

c. Width 3 inches

d. Length 3.4 ft.

e. Location Spillover in the center of the dam

f. Number and Type of Gates one, steel plate

OTHER EMBANKMENT: dike

a. Type earthfill

b. Location northeast end of the lake

c. Entrance Inverts 491.5 ft. (NGVD)

d. Exit Inverts not applicable

e. Emergency Draindown Facilities none

HYDROMETEORLOGICAL GAGES: none

a. Type

b. Location

c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 50 cfs

APPENDIX 2

PHOTOGRAPHS

WILDWOOD LAKE DAM

NOVEMBER 08 1979
CREST OF THE DAM LOOKING NORTH FROM THE SPILLWAY STRUCTURE.

NOVEMBER 08 1979
VIEW OF THE CREST, SPILLWAY STRUCTURE AND SOUTH ABUTMENT OF THE DAM.

NOVEMBER 08 1979
CREST OF THE DAM LOOKING NORTH FROM SOUTH ABUTMENT.

NOVEMBER 08 1979
SCHOOL DOWNSTREAM OF DAM VIEWED FROM NEAR SOUTH ABUTMENT.

NOVEMBER 08 1979
VIEW OF THE SCHOOL BUILDING FROM THE CREST OF THE DAM.

NOVEMBER 08 1979
DOWNSTREAM FACE OF THE DAM LOOKING FROM THE SCHOOL.

NOVEMBER 08 1979
LOOKING AT THE TOP OF THE INLET BOX AND GATE MECHANISM.

NOVEMBER 8 1979
VIEW UPSTREAM TOWARD OUTLET OF SPILLWAY
DISCHARGE PIPE LOCATED BEHIND THE SCHOOL.

NOVEMBER 08 1979
EXTENSIVE EROSION ON DOWNSTREAM SLOPE IN VICINITY OF SPILLWAY STRUCTURE.

NOVEMBER 08 1979
EROSION OF UPSTREAM FACE OF THE DAM APPROXIMATELY 60 FEET NORTH OF SPILLWAY.

NOVEMBER 08 1979
VIEW OF THE NORTHEAST DIKE LOOKING EAST.

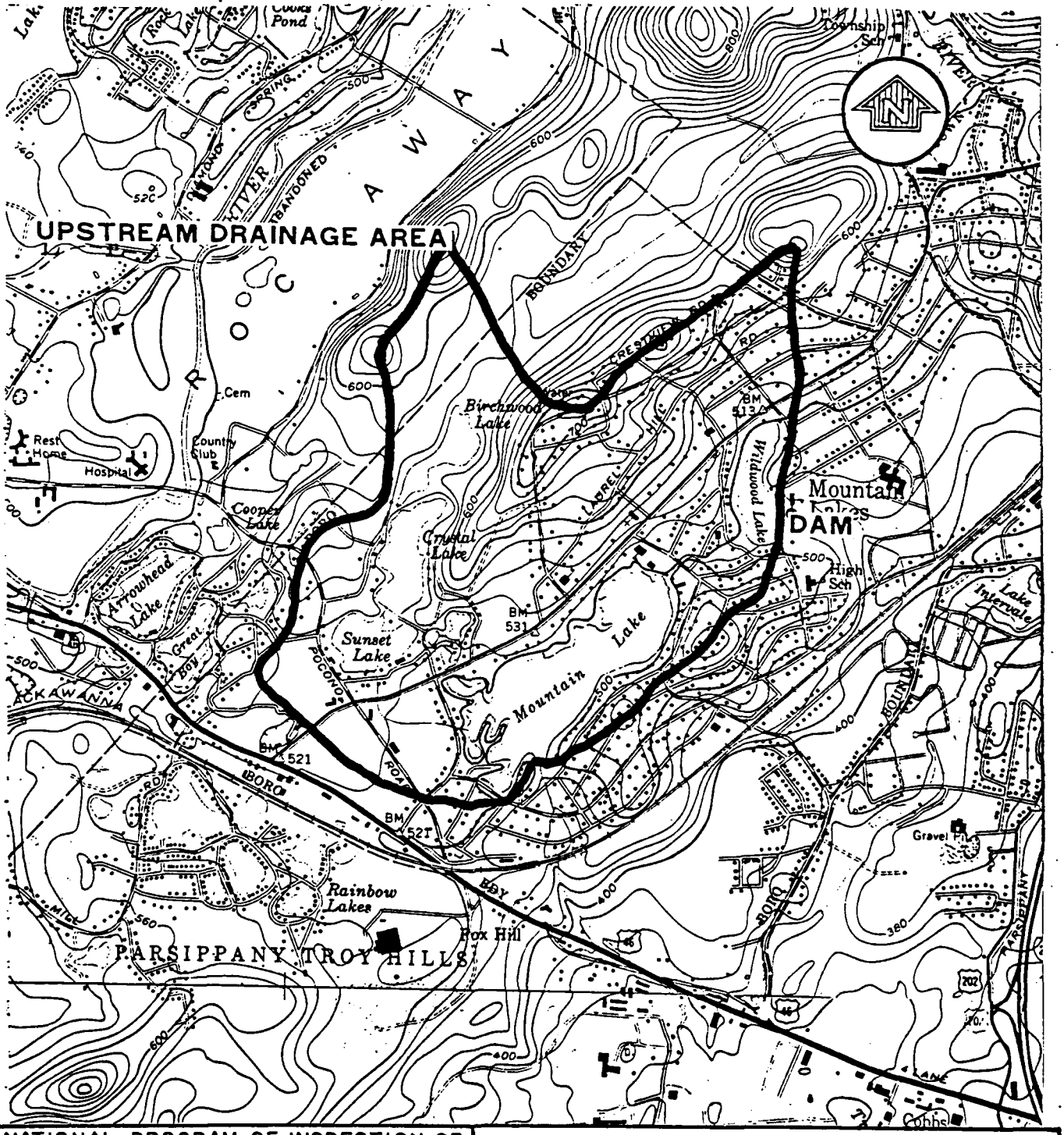
NOVEMBER 08 1979
LOOKING DOWNSTREAM FROM THE CREST OF NORTHEAST DIKE.

NOVEMBER 08 1979
VIEW OF THE RESERVOIR FROM THE SPILLWAY STRUCTURE LOOKING TOWARD INLET CHANNEL.

APPENDIX 3

HYDROLOGIC COMPUTATIONS

WILDWOOD LAKE DAM



NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

WILDWOOD LAKE DAM
BOROUGH OF MOUNTAIN LAKES, NEW JERSEY

REGIONAL VICINITY MAP

JANUARY 1980

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

ANDERSON-NICHOLS & CO., INC. BOSTON, MA.

SCALE IN MILES

0 1/2 1

MAP BASED ON U.S.G.S. 7.5 MINUTE QUADRANGLE SHEETS. BOONTON, N.J., 1954, UPDATED 1970. MORRISTOWN, N.J., 1954, UPDATED 1970.

Anderson-Nichols & Company, Inc.

Subject M & M

Sheet No. 1 of 13
Date 1-9-80
Computed D.C.
Checked PDD

JOB NO. 3409 - 06

SQUARES 1/4 IN. SCALE

WILDWOOD LAKE DAM

HYDROLOGIC CALCULATIONS

LOCATION : MORRIS COUNTY, N.J.
DRAINAGE AREA : 1.27 SQ. MILE.
EVALUATION CRITERIA: SIZE - INTERMEDIATE
HAZARD - HIGH

APPROACH: AS DIRECTED BY DEPARTMENT OF THE ARMY, PHILADELPHIA DISTRICT. CORPS OF ENGINEERS / CUSTOM HOUSE - - 2 & CHESTNUT STREETS, PHILADELPHIA, PENNSYLVANIA 19106 IN THE LETTERS DATED 29 MAY 1979 & 12 DEC 1979 FROM LEONARD J. LIPSKI CHIEF OF HYDROLOGY - HYDRAULIC BRANCH, THE FOLLOWING APPROACH WAS TAKEN:
THE OUTFLOW FROM SUNSET LAKE WAS ROUTED TO MOUNTAIN LAKE DAM AND ADDED TO THE LOCAL INFLOW. SINCE MOUNTAIN LAKE AND WILDWOOD LAKE ARE INTER- - CONNECTED AND AT APPROXIMATELY THE SAME ELEVATION, THEY WERE TREATED AS ONE RESERVOIR IN TERMS OF DEVELOPING THE STORAGE - DISCHARGE RELATIONSHIP.

SQUARES 1/4 IN. SCALE

WILDWOOD LAKE DAM — COMPUTATION OF TIME OF CONCENTRATION.

ONLY FOR
INTERMEDIATE DRAINAGE AREA — .90 SQUARE MILE
OVERLAND FLOW: LENGTH $L = 2500$ FT
AVERAGE SLOPE $S = .09$

1. THE TEXAS HIGHWAY VELOCITY DATA FROM DESIGN OF FINAL DAMS

$S - 9\%$, WOODLAND $\longrightarrow$ 3.0 FT/SEC

$$\frac{2500 \text{ FT}}{3.0 \text{ FT/SEC}} = .23 \text{ hr}$$

2. THE SCS TR-55 — WESTON "STORM WATER MANAGEMENT"

AVERAGE VELOCITY FOR WOODLAND $\longrightarrow$ .75 FT/SEC

$$T_c = \frac{2500 \text{ FT}}{3600 \times .75 \text{ FT/sec}} = .92 \text{ hr}$$

3. METHOD FROM SOIL AND WATER CONSERVATION ENG.

SLOPE - Y - 9% $\quad S = \frac{1000}{N} - 10 \quad N = 70$ FOR WOODS

$S = 4.3$

$$.6\,T_c = \frac{L^{.8}(S+1)^{1.67}}{9000\,Y^{.5}} = .31 \text{ hr}$$

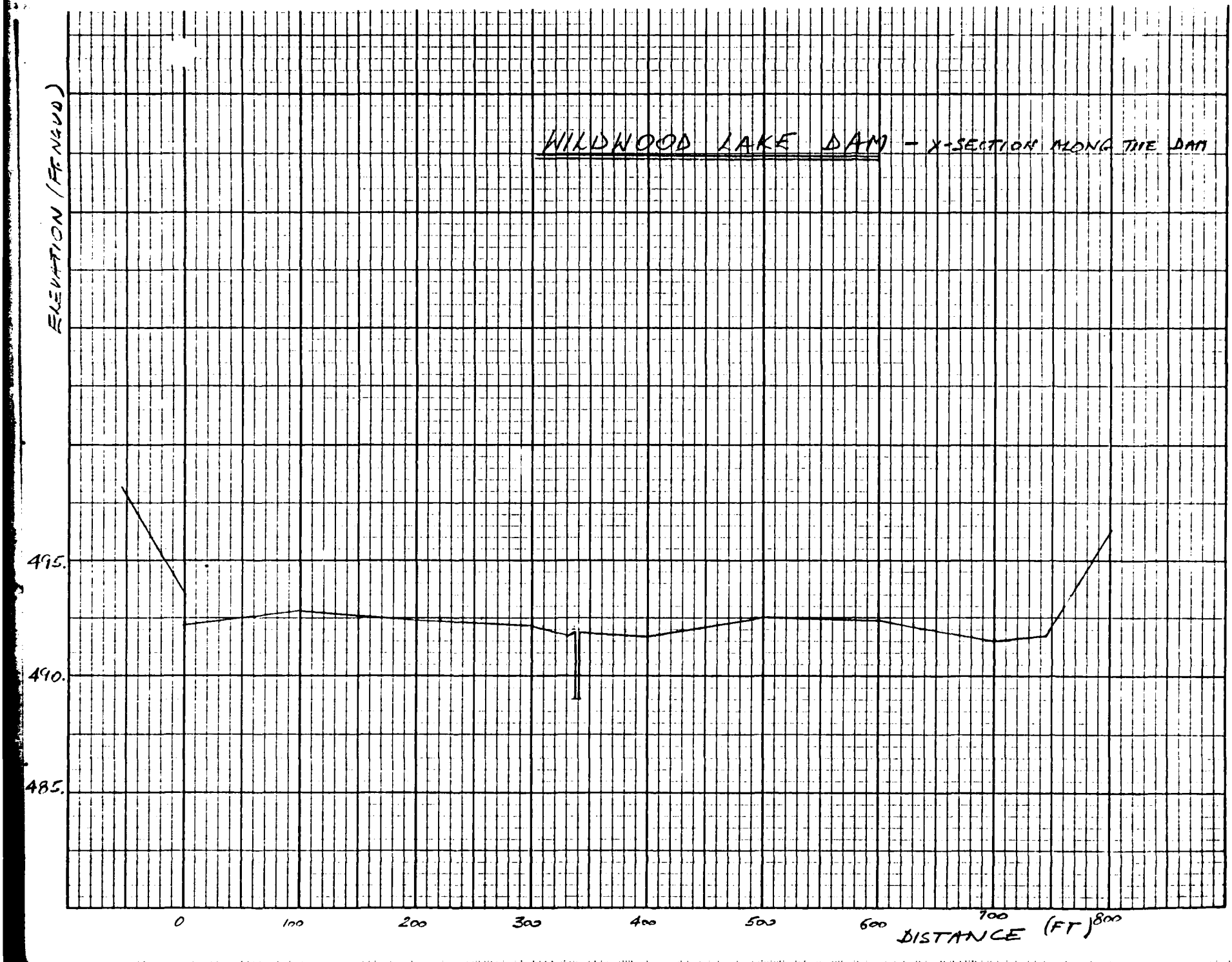
4. KIRBY METHOD IN "WORKSHOP NOTES ON STORM SEWER SYSTEM DESIGN"

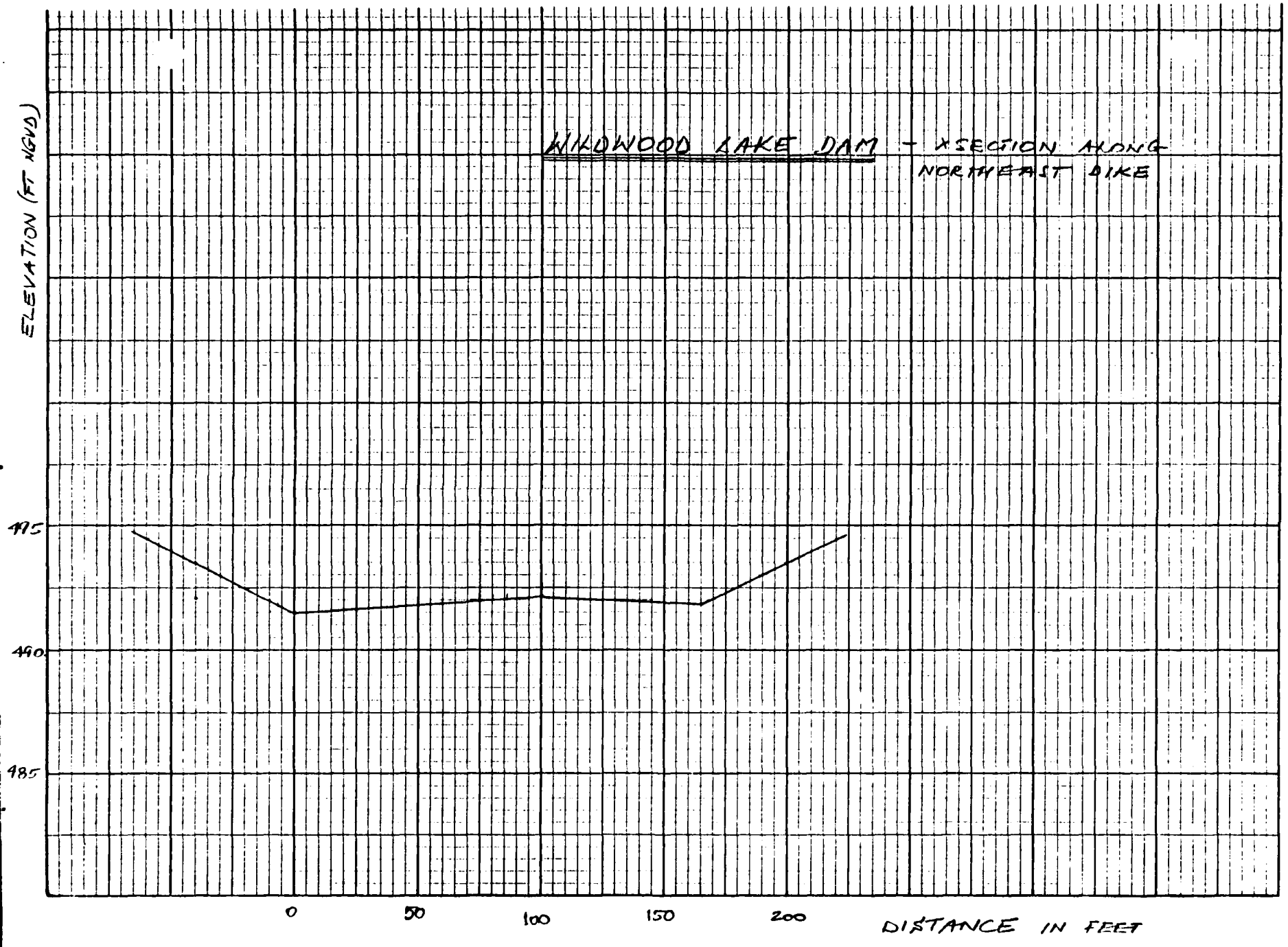
$$T_c = .83\left(\frac{NL}{\sqrt{S}}\right)^{.467} =$$

N - FOR TIMBERLAND = .6

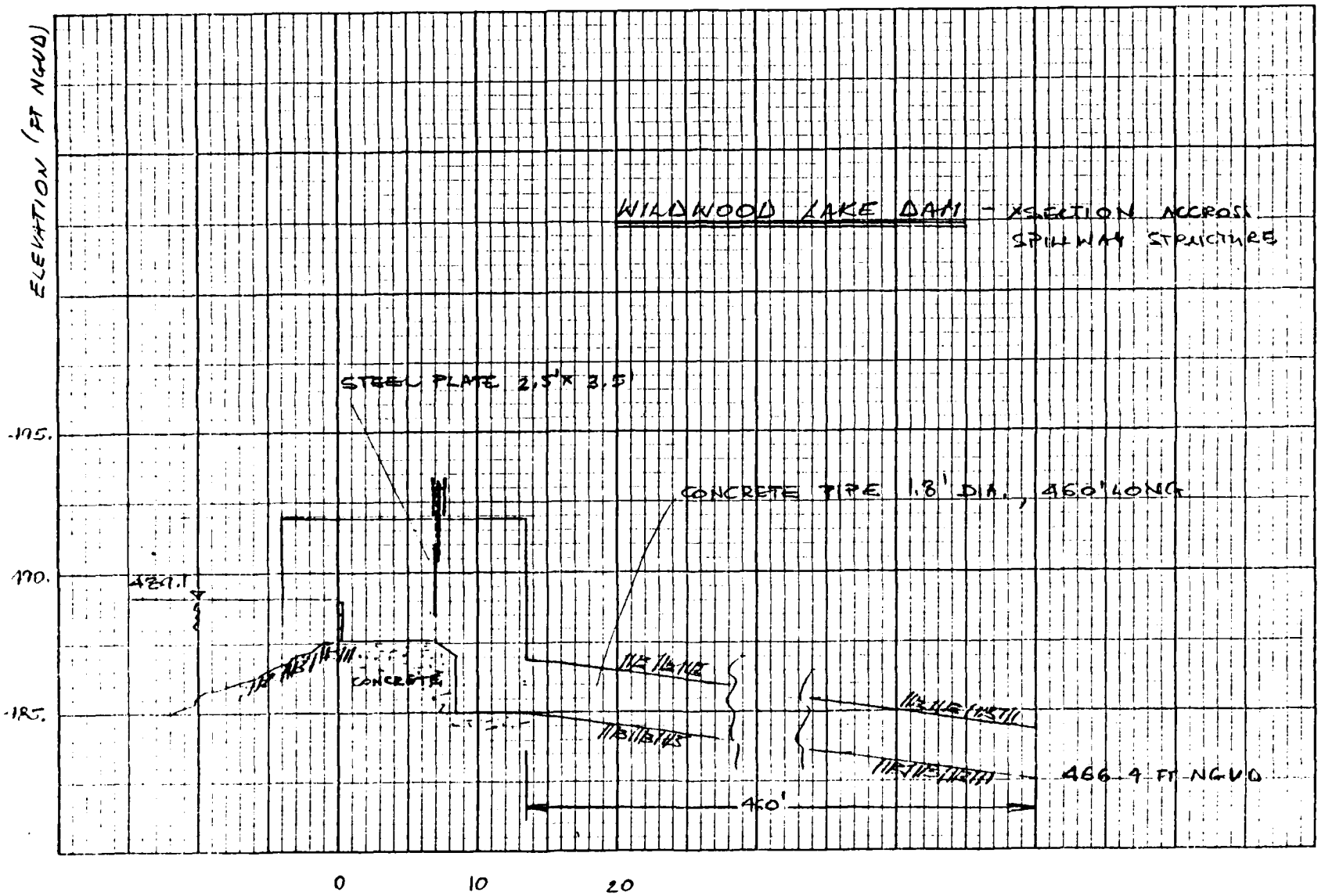
$$= .83\left(\frac{.6 \cdot 2500}{\sqrt{.09}}\right)^{.467} = 44 \text{ MIN} = .74 \text{ hr}$$

AVERAGE TIME OF CONCENTRATION $= \frac{.23 + .92 + .31 + .74}{4} = .55$ hr


WILDWOOD LAKE DAM - X-SECTION ALONG THE DAM
ELEVATION (FT NGVD)
495.
490.
485.
0
100
200
300
400
500
600
700
800
DISTANCE (FT)



4 of 13


WILDWOOD LAKE DAM - XSECTION ACCROSS SPILLWAY STRUCTURES
ELEVATION (FT NGVD)
STEEL PLATE 2.5'X 2.5'
CONCRETE TYPE 1.8' DIA., 460' LONG
CONCRETE
466.4 FT NGVD
460'
-175.
-170.
-165.
0
10
20

Anderson-Nichols & Company, Inc. Subject H & H

JOB NO. 3209-06

Sheet No. 6 of 13
Date 1-3-80
Computed J.G.
Checked EDD

SQUARES 1/4 IN. SCALE 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29

WILDWOOD LAKE DAM - RATING CURVE COMPUTATION.

1. DISCHARGE OVER THE STOPLOGS ONLY

$L = 3.4$ FT $C = 2.5$ $Q = C \cdot L H^{3/2}$

ELEV. (FT. NGVD)	H (FT)	Q (CFS)
489.	0	0
489.5	.5	4.2
489.9	.9	10.2
490.5	1.5	21.9
491.	2.0	33.7
491.5	2.5	47.0
491.9	2.9	58.8

2. DISCHARGE THROUGH THE STEEL GATE

a) BOTTOM OPENING

BOTOM OPENING 3.4 FT x .9 FT A = 3.06 SQ FT

AT POOL ELEVATION 489.9 FT. NGVD Q → 10.2 CFS

ELEV. (FT NGVD)	h (FT)	Q (CFS)
491.	3.0	25.9
491.9	3.9	29.6

$Q = A C \sqrt{2gh}$

$C = .61$

b) TOP OPENING

ELEV. (FT NGVD)	H (FT)	Q (CFS)
491.9	.9	10.2

$Q = C \cdot L H^{3/2}$

$L = 3.4$ $C = 3.5$

TOTAL Q AT 491.9 FT NGVD → 39.8 CFS

2. DISCHARGE THROUGH THE OUTLET PIPE ONLY

$L = 460$ FT $S = .040$ $n = .016$ $d = 1.8' - 21.6''$ $A = 2.54$ SQFT

$$Q = A\sqrt{\frac{2gh}{1+\Sigma K}}$$

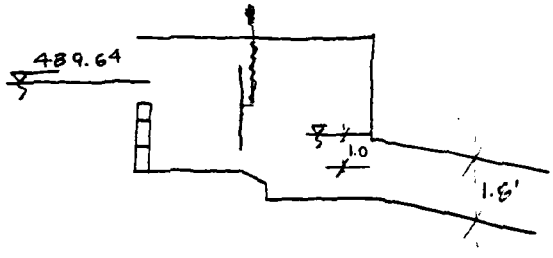
K_p - FRICTION LOSS $= \frac{5087\,n^2}{d^{4/3}}$

$K_p = .0216$

FRICTION LOSS $= 460 \times .0216 = 9.96$

INLET LOSS $- K_o = .10$ (FROM BRATER & KING HANDBOOK OF HYDRAULIC p 4,26)

$\Sigma K = 10.06$



FULL FLOWING PIPE WITH 1.0 FT HEAD IS DISCHARGING 6.1 CFS, TO DISCHARGE 6.1 CFS OVER THE STOPLOGS HEAD OF THE WEIR MUST BE:

$$6.1 = 3.4 \times 3.5\sqrt{H^3} \qquad H = .64 \text{ FT}$$

CONCLUSION: VOLUME OF DISCHARGE THROUGH THE SPILLWAY STRUCTURE IS DETERMINED BY:

STOPLOGS UP TO THE POOL ELEV. - 489.64 FT. NGVD

OUTLET DISCHARGE PIPE - ABOVE THE ELEV. - 489.64 FT NGVD

ELEV. (FT. NGVD)	h (FT)	Q (CFS)
490.	4.1	12.4
491.	5.1	13.8
491.5	5.6	14.5
492.	6.1	15.1
492.3	6.4	15.5
493.	7.1	16.3
493.5	7.6	16.9
494.	8.1	17.4

SQUARES 1/4 IN. SCALE

4. DISCHARGE OVER THE DAM ONLY

$C = 2.8$ $Q = C \cdot L \cdot H^{3/2}$

POOL ELEV. (FT NGVD)	H (FT)	L (FT)	H (FT)	L (FT)	H (FT)	L (FT)	TOTAL Q (CFS)
492.	.5	60	.3	50.			82.4
492.3	.8	110	.3	250.			335.
493.	1.5	120.	1.0	260.	.5	200.	1543.
493.5	2.0	130.	1.5	250.	1.0	350.	3295.

5. DISCHARGE OVER THE NORTHEAST DIKE

$C = 2.9$ $Q = C \cdot L \cdot H^{3/2}$

POOL ELEV. (FT NGVD)	H (FT)	L (FT)	H (FT)	L (FT)	TOTAL Q (CFS)
492.	.5	45			46.
492.3	.8	65	.3	65	166.
493.	1.5	85.	1.0	75	670.
493.5	2.0	100.	1.5	80	1246.

Anderson-Nichols & Company, Inc. Subject HSM

Sheet No. 9 of 13
Date 1-2-80
Computed JC
Checked FDD

JOB NO. 3209 -06 WILDWOOD LAKE DAM

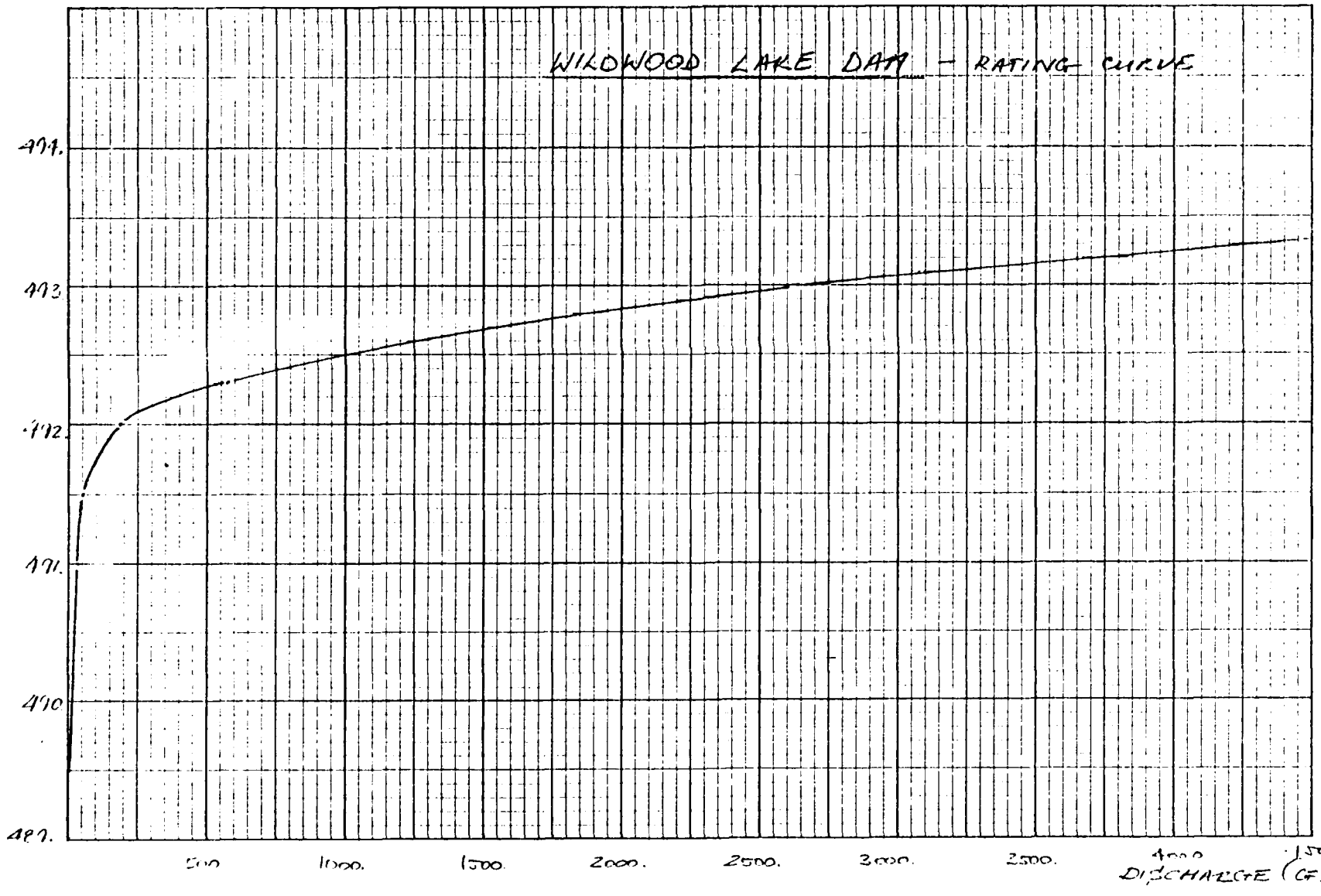
SQUARES 1/4 IN. SCALE 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29

DISCHARGE COMPUTATIONS - SUMMARY

POOL ELEV. (FT NGVD)	MOUNTAIN LAKE DISCHARGE (CFS) *	WILDWOOD LAKE DISCHARGE SPILLWAY (CFS)	WILDWOOD LAKE DISCHARGE DAM (CFS)	WILDWOOD LAKE DISCHARGE DIKE (CFS)	TOTAL DISCHARGE (CFS)	
489.	0.	0.	0.	0.	0.	
489.5	.9	4.2			4.6	
489.64	1.0	6.1			7.1	
491.	23.4	13.8**			37.	
491.5	35.1	14.5			50.	TOP OF DAM
492.	48.4	15.1	82.	46.	192.	
492.3	TOP OF MOUNTAIN DAM 57.	15.5	335	166	574.	
493.	412	16.3	1543.	670.	2640.	
493.5	920	16.9	3295	1246	5480.	

* INFORMATION OBTAINED FROM PHASE I INSPECTION REPORT - - MOUNTAIN LAKE DAM NJ 00284.

** DISCHARGE PIPE IS ASSUMED TO CONTROL AT AND ABOVE THIS ELEVATION. BECAUSE OF UNKNOWN CONDITIONS IN THE PIPE, I.E. CONTRIBUTING STORM DRAINS, BENDS, SLOPES AND CONSTANT PIPE SIZE THE MOST CONSERVATIVE CONDITION WAS TAKEN.



Anderson-Nichols & Company, Inc.

Subject H S A / 1

Sheet No. 11 of 13
Date 1-4-80
Computed
Checked OFDD

JOB NO. 3409-06

SQUARES 1/4 IN. SCALE

WILDWOOD LAKE DAM

STORAGE COMPUTATION

NORMAL STORAGE (SPILLWAY CREST - 489. FT MSL) - 120. AC-FT (WILDWOOD LAKE ONLY)

120 AC-FT WAS OBTAINED BY ESTIMATING AVERAGE DEPTH OF WILDWOOD LAKE ~ 7.5 FT AND PLANIMETERING SURFACE OF RESERVOIR FROM QUAD SHEET - 16 AC.
FOR MOUNTAIN LAKE AVERAGE DEPTH WAS ESTIMATED TO BE ABOUT 9.5 FT AND PLANIMETERED SURFACE IS 75.3 AC. 715 AC-FT STORAGE OF MOUNTAIN LAKE WAS ADDED TO 120 AC-FT OF WINDWOOD LAKE TO OBTAINED TOTAL STORAGE OF RESERVOIR

USING "FRUSTRUM OF PYRAMID EQUATION" STORAGE - ELEVATION RELATIONSHIP WAS DEVELOP.

$$\Delta V = \tfrac{1}{2} h \left(b_1 + b_2 + \sqrt{b_1 b_2} \right)$$

h - elev. above normal pool
b_1 - normal pool surface
b_2 - enlarge - " -

	MOUNTAIN LAKE DAM				WILDWOOD LAKE DAM				
ELEV. (FT. NGVD)	b_1 (AC)	b_2 (AC)	h (FT)	ΔV (AC-FT)	b_1 (AC)	b_2 (AC)	h FT	ΔV (AC-FT)	TOTAL AC-FT
489	75.3				16.				835
491.5	75.3	75.8	2.5	189.	16.	16.3	2.5	41.	1065.
492.3	75.3	77.	3.3	251.	16.	17.5	3.3	55.	1141.
493.5	75.3	78.	4.5	345.	16.	18.0	4.5	76.	1256.

Anderson-Nichols & Company, Inc.

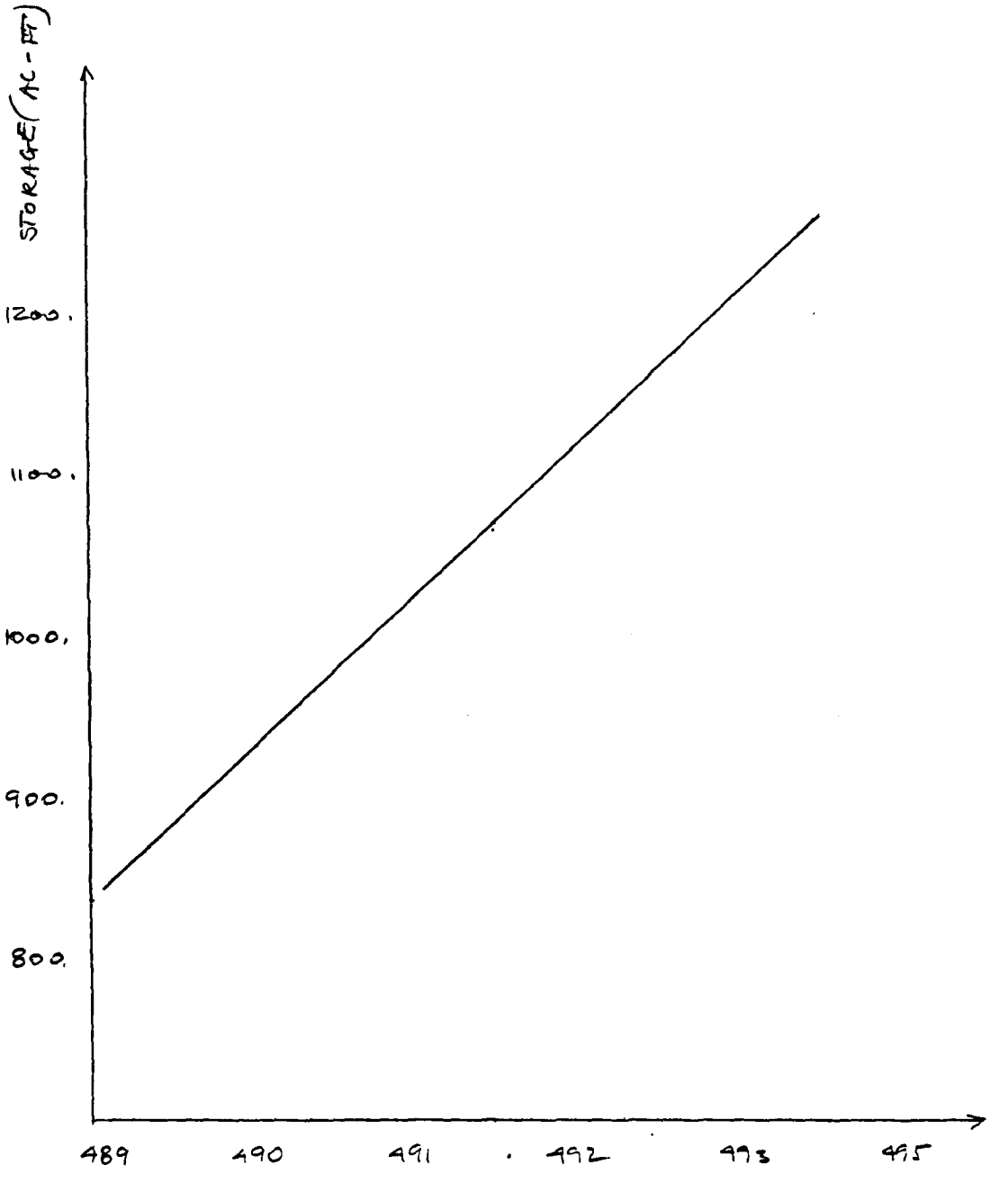
Subject H & H.

Sheet No. 12 of 13
Date 1-7-80
Computed
Checked

JOB NO. 3409 - 06 WILDWOOD LAKE DAM

SQUARES 1/4 IN. SCALE

STORAGE - ELEVATION CURVE



Anderson-Nichols & Company, Inc.

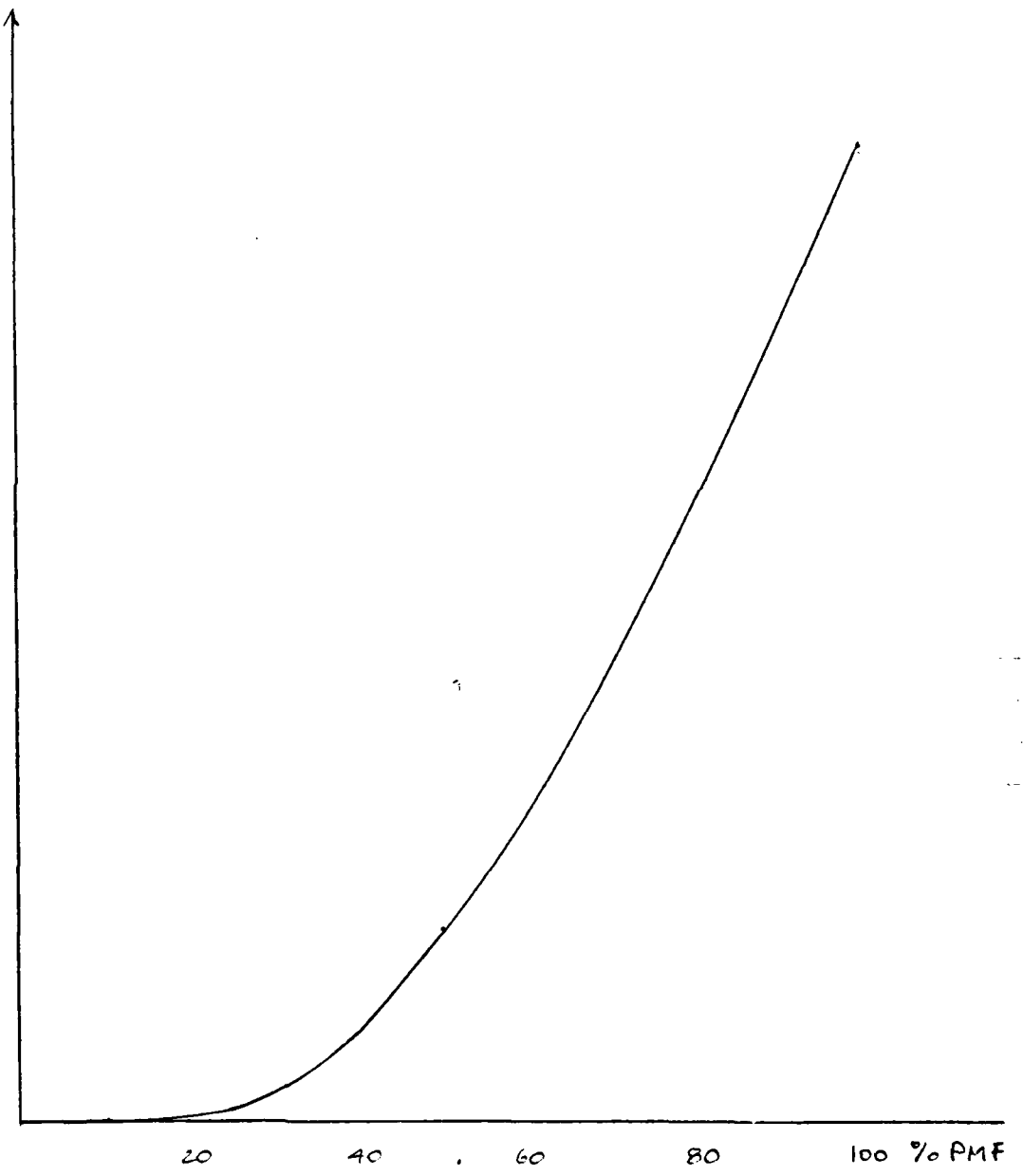
Subject A & H

Sheet No. 13 of 13
Date 1-15-80
Computed J.G.
Checked [illegible] J

JOB NO. 3409-06

SQUARES 1/4 IN. SCALE

WILDWOOD LAKE DAM



DAM OVERTOPS AT ELEVATION 491.5 FT. NGVD.

DAM CAN PASS ~ 1% OF PMF

HEC-1 OUTPUT

WILDWOOD LAKE DAM

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********
    1                 A1JOB 3409-06 WILDWOOD LAKE DAM BOROUGH OF MOUNTAIN LAKES,N.J. NJ#25-56 US#562
    2                 A2OVERTOPPING ANALYSIS ANDERSON-NICHOLS & CO. INC. CONCORD,N.H.
    3                 A3              1.0 MULTIPLE OF PMF FROM 6 HOUR PMP
    4                 P      90       0       5       0       0       0       0       0       0       0
    5                 P1      5
    6                 J       1       1       1
    7                 J1     1.
    8                 K                A1                              1       1
    9                 K1OUTFLOW HYDROGRAPH FROM BIRCHWOOD LAKE USE TO COMPUTE .1 MULTIPLE OF PMF
   10                 M      -1               .20                                             0
   11                 N       0       0       0       0       0       0       0       1       2       3
   12                 N       3       5       5       6       6       6       6       6       7       7
   13                 N      10      13      17      22      25      30      38      45      50      58
   14                 N      60      63      66      69      72      74      76      78      80      82
   15                 N      84     115     310     680     790     680     470     310     250     150
   16                 N     115      90      84      82      80      78      76      74      72      70
   17                 N      68      66      64      60      56      52      48      44      40      36
   18                 N      32      28      24      22      15      10       7       6       6       6
   19                 N       6       6       6       6       6       6       6       6       6       6
   20                 K                A2                              1       1
   21                 K1DEVELOP INFLOW HYDROGRAPH FOR INTERMEDIATE DRAINAGE AREA FOR CRYSTAL LAKE
   22                 K                2      .09                      .8                      1
   23                 P      79
   24                 Q1   .213     .213     .213     .213     .213     .213     .213     .213     .213     .213
   25                 Q1   .213     .213     .255     .255     .255     .255     .255     .255     .255     .255
   26                 Q1   .255     .255     .255     .255     .319     .319     .319     .319     .319     .319
   27                 Q1   .319     .319     .319     .319     .319     .319     .194     .388     .388     .581
   28                 Q1   .678    1.647    2.713    1.066     .678     .581     .388     .388     .298     .298
   29                 Q1   .298     .298     .298     .298     .298     .298     .298     .298     .298     .298
   30                 Q1   .234     .234     .234     .234     .234     .234     .234     .234     .234     .234
   31                 Q1   .234     .234
   32                 T                                                        1.       .1
   33                 V2               .13
   34                 Y       -3
   35                 K        2       A3                              1       1
   36                 K1DEVELOP COMPINE INFLOW HYDROGRAPH FOR CRYSTAL LAKE DAM
   37                 K        1       A4                              1       1
   38                 K1ROUTE INFLOW HYDROGRAPH THROUGH IMPOUNDMENT
   39                 Y                                1       1
   40                 Y1       1                                      -535.2      -1
   41                 Y4   535.1    535.2    535.4    535.6    535.8     536.    536.2    536.4    536.6    536.8
   42                 Y4    537.     537.5     538.     539.     540.
   43                 Y5      .0      .25      1.3     2.78     4.61      6.7      23.      72.     164.     308.
   44                 Y5    456.     985.    1750.    3650.    6280.
   45                 Y8   115.8    125.4    134.6    146.2    167.5    178.2     199.     211.
   46                 Y8   535.1    535.6     536.     536.6    537.5     538.     539.     540.
   47                 Y1   535.1
   48                 Y0    536.
   49                 K                A5                              1       1
   50                 K1DEVELOP INFLOW HYDROGRAPH FOR INTERMEDIATE DRAINAGE AREA FOR SUNSET LAKE
```

```
M              2      .08                             .8                      1
O     72
O1  .213    .213    .213    .213    .213    .213    .213    .213    .213    .213
O1  .213    .213    .255    .255    .255    .255    .255    .255    .255    .255
O1  .255    .255    .255    .255    .319    .319    .319    .319    .319    .319
O1  .319    .319    .319    .319    .319    .319    .194    .388    .388    .581
O1  .678   1.647   2.713   1.066    .678    .581    .388    .388    .298    .298
O1  .298    .298    .298    .298    .298    .298    .298    .298    .298    .298
O1  .234    .234    .234    .234    .234    .234    .234    .234    .234    .234
O1  .234    .234
T                                                    1.      .1
W2          .25
X     -3
K      2      A6                                1       1
K1DEVELOP COMBINE INFLOW HYDROGRAPH FOR SUNSET LAKE DAM
K      1      A7                                1       1
K1ROUTE HYDROGRAPH THROUGH IMPOUNDMENT
Y                                 1       1
Y1     1                                            -522.3      -1
Y4 522.2   522.3   522.5    523.    523.5    524.   524.5    525.
Y5    .0      .8     6.3    142.     453.    967.   2095.   2503.
$S  73.5     74.    103.
$E 522.2   522.3    524.
$$ 522.2
$D 522.3
K      1      A8                                1       1
K1ROUTE OUTFLOW TO INLET OF MOUNTAIN LAKE
Y                                 1       1
Y1     1                                               -1
Y6   .05     .35     .05   489.1     510.   2000.   .0166
Y7    0.    510.    100.    500.     800.    500.    880.   489.1    885.   489.1
Y7  985.    500.   1185.    500.    1555.    510.
K             A9                                1       1
K1DEVELOP INFLOW HYDROGRAPH FOR INTERMEDIATE DRAINAGE AREA FOR WILDWOOD LAKE
M              2      .90                             .8                      1
O     72
O1  .213    .213    .213    .213    .213    .213    .213    .213    .213    .213
O1  .213    .213    .255    .255    .255    .255    .255    .255    .255    .255
O1  .255    .255    .255    .255    .319    .319    .319    .319    .319    .319
O1  .319    .319    .319    .319    .319    .319    .194    .388    .388    .581
O1  .678   1.647   2.713   1.066    .678    .581    .388    .388    .298    .298
O1  .298    .298    .298    .298    .298    .298    .298    .298    .298    .298
O1  .234    .234    .234    .234    .234    .234    .234    .234    .234    .234
O1  .234    .234
T                                                    1.      .1
W2          .33
X     -3
K      2     A10                                1       1
K1DEVELOP COMBINE INFLOW HYDROGRAPH FOR WILDWOOD LAKE DAM
K      1     A11                                1       1
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101             KIROUTE HYDROGRAPH THROUGH IMPOUNDMENT
102             Y                                   1       1
103             Y1      1                                           -492.1      -1
104             YA  489.    489.5   489.6   491.    491.5   492.    492.3   493.    493.5
105             Y5    .0      4.6     7.1     37.     50.     192.    574.    2640.   5400.
106             1S  835.    1065.   1141.   1256.
107             1F  489.    491.5   492.3   493.5
108             11  489.
109             1D  491.5
110             K     99
```

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**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********************************

RUN  DATE= 80/01/08.
     TIME= 14.29.28.
```

JOB 3909-06 WILDWOOD LAKE DAM BOROUGH OF MOUNTAIN LAKES,N.J. NJ#25-56 USN562
OVERTOPPING ANALYSIS ANDERSON-NICHOLS & CO. INC. CONCORD,N.H.
1.0 MULTIPLE OF PMF FROM 6 HOUR PMP

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
99	0	5	0	0	0	0	0	0	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 1 LRTIO= 1

RTIOS= 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

OUTFLOW HYDROGRAPH FROM BIRCHWOOD LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A1	0	0	0	0	1	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	.26	0.00	.26	0.00	0.000	0	0	0

INPUT HYDROGRAPH

0.	0.	0.	0.	0.	0.	0.	1.	2.	3.
3.	5.	5.	6.	6.	6.	6.	6.	7.	7.
10.	13.	17.	22.	25.	30.	38.	45.	50.	58.
60.	63.	66.	69.	72.	74.	76.	78.	80.	82.
84.	115.	310.	680.	790.	680.	470.	310.	250.	150.
115.	90.	84.	82.	80.	78.	76.	74.	72.	70.
68.	66.	64.	60.	56.	52.	48.	44.	40.	36.
32.	28.	24.	22.	15.	10.	7.	6.	6.	6.
6.	6.	6.	6.	6.	6.	6.	6.	6.	6.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	790.	90.	72.	72.	6498.
CMS	22.	3.	2.	2.	184.
INCHES		4.17	4.20	4.20	4.20
MM		105.87	106.62	106.62	106.62
AC-FT		44.	45.	45.	45.
THOUS CU M		55.	55.	55.	55.

HYDROGRAPH AT STA A1 FOR PLAN 1, RTIO 1

0.	0.	0.	0.	0.	0.	0.	1.	2.	3.
3.	5.	5.	6.	6.	6.	6.	6.	7.	7.
10.	13.	17.	22.	25.	30.	38.	45.	50.	58.
60.	63.	66.	69.	72.	74.	76.	78.	80.	82.
84.	115.	310.	680.	790.	680.	470.	310.	250.	150.
115.	90.	84.	82.	80.	78.	76.	74.	72.	70.
68.	66.	64.	60.	56.	52.	48.	44.	40.	36.
32.	28.	24.	22.	15.	10.	7.	6.	6.	6.
6.	6.	6.	6.	6.	6.	6.	6.	6.	6.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	790.	90.	72.	72.	6498.
CMS	22.	3.	2.	2.	184.
INCHES		4.17	4.20	4.20	4.20
MM		105.87	106.62	106.62	106.62
AC-FT		44.	45.	45.	45.
THOUS CU M		55.	55.	55.	55.

********** *********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

DEVELOP INFLOW HYDROGRAPH FOR INTERMEDIATE DRAINAGE AREA FOR CRYSTAL LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A2	0	0	0	0	1	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	2	.09	0.00	.09	.80	0.000	0	1	0

PRECIP DATA

NP	STORM	DAJ	DAK
72	0.00	0.00	0.00

PRECIP PATTERN

.21	.21	.21	.21	.21	.21	.21	.21	.21	.21
.21	.21	.26	.26	.26	.26	.26	.26	.26	.26
.26	.26	.26	.26	.32	.32	.32	.32	.32	.32
.32	.32	.32	.32	.32	.32	.19	.39	.39	.58
.68	1.65	2.71	1.07	.68	.58	.39	.39	.30	.30
.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
.23	.23	.23	.23	.23	.23	.23	.23	.23	.23
.23	.23								

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOR	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.10	0.00	0.00

UNIT HYDROGRAPH DATA

TC= 0.00 LAG= .13

RECESSION DATA

STRTQ= -3.00 QRCSN= 0.00 RTIOR= 1.00

TIME INCREMENT TOO LARGE--(NHQ IS GT LAG/2)

UNIT HYDROGRAPH 10 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .13 VOL= 1.00

114. 254. 184. 79. 36. 16. 7. 3. 2. 0.

P PC.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	PC.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.17	0.00	.17	0.	1.01	3.50	46	.46	.46	.01	575.
1.01	.10	2	.17	0.00	.17	0.	1.01	3.55	47	.31	.30	.01	421.
1.01	.15	3	.17	0.00	.17	0.	1.01	4.00	48	.31	.30	.01	316.
1.01	.20	4	.17	0.00	.17	0.	1.01	4.05	49	.24	.23	.01	250.
1.01	.25	5	.17	0.00	.17	0.	1.01	4.10	50	.24	.23	.01	206.
1.01	.30	6	.17	.02	.15	3.	1.01	4.15	51	.24	.23	.01	181.
1.01	.35	7	.17	.16	.01	24.	1.01	4.20	52	.24	.23	.01	169.
1.01	.40	8	.17	.16	.01	64.	1.01	4.25	53	.24	.23	.01	164.
1.01	.45	9	.17	.16	.01	91.	1.01	4.30	54	.24	.23	.01	162.
1.01	.50	10	.17	.16	.01	103.	1.01	4.35	55	.24	.23	.01	161.
1.01	.55	11	.17	.16	.01	109.	1.01	4.40	56	.24	.23	.01	161.
1.01	1.00	12	.17	.16	.01	111.	1.01	4.45	57	.24	.23	.01	161.
1.01	1.05	13	.20	.20	.01	116.	1.01	4.50	58	.24	.23	.01	161.
1.01	1.10	14	.20	.20	.01	125.	1.01	4.55	59	.24	.23	.01	161.
1.01	1.15	15	.20	.20	.01	132.	1.01	5.00	60	.24	.23	.01	161.
1.01	1.20	16	.20	.20	.01	134.	1.01	5.05	61	.19	.18	.01	155.
1.01	1.25	17	.20	.20	.01	136.	1.01	5.10	62	.19	.18	.01	142.
1.01	1.30	18	.20	.20	.01	136.	1.01	5.15	63	.19	.18	.01	132.
1.01	1.35	19	.20	.20	.01	136.	1.01	5.20	64	.19	.18	.01	128.
1.01	1.40	20	.20	.20	.01	137.	1.01	5.25	65	.19	.18	.01	126.
1.01	1.45	21	.20	.20	.01	137.	1.01	5.30	66	.19	.18	.01	126.
1.01	1.50	22	.20	.20	.01	137.	1.01	5.35	67	.19	.18	.01	125.
1.01	1.55	23	.20	.20	.01	137.	1.01	5.40	68	.19	.18	.01	125.
1.01	2.00	24	.20	.20	.01	137.	1.01	5.45	69	.19	.18	.01	125.
1.01	2.05	25	.26	.25	.01	142.	1.01	5.50	70	.19	.18	.01	125.
1.01	2.10	26	.26	.25	.01	155.	1.01	5.55	71	.19	.18	.01	125.
1.01	2.15	27	.26	.25	.01	165.	1.01	6.00	72	.19	.18	.01	125.
1.01	2.20	28	.26	.25	.01	169.	1.01	6.05	73	0.00	0.00	0.00	105.
1.01	2.25	29	.26	.25	.01	171.	1.01	6.10	74	0.00	0.00	0.00	59.
1.01	2.30	30	.26	.25	.01	172.	1.01	6.15	75	0.00	0.00	0.00	26.
1.01	2.35	31	.26	.25	.01	172.	1.01	6.20	76	0.00	0.00	0.00	12.
1.01	2.40	32	.26	.25	.01	172.	1.01	6.25	77	0.00	0.00	0.00	6.
1.01	2.45	33	.26	.25	.01	172.	1.01	6.30	78	0.00	0.00	0.00	3.
1.01	2.50	34	.26	.25	.01	172.	1.01	6.35	79	0.00	0.00	0.00	1.
1.01	2.55	35	.26	.25	.01	172.	1.01	6.40	80	0.00	0.00	0.00	1.
1.01	3.00	36	.26	.25	.01	172.	1.01	6.45	81	0.00	0.00	0.00	0.
1.01	3.05	37	.16	.15	.01	161.	1.01	6.50	82	0.00	0.00	0.00	0.
1.01	3.10	38	.31	.30	.01	153.	1.01	6.55	83	0.00	0.00	0.00	0.
1.01	3.15	39	.31	.30	.01	174.	1.01	7.00	84	0.00	0.00	0.00	0.
1.01	3.20	40	.46	.46	.01	212.	1.01	7.05	85	0.00	0.00	0.00	0.
1.01	3.25	41	.54	.53	.01	269.	1.01	7.10	86	0.00	0.00	0.00	0.
1.01	3.30	42	1.32	1.31	.01	410.	1.01	7.15	87	0.00	0.00	0.00	0.
1.01	3.35	43	2.17	2.16	.01	732.	1.01	7.20	88	0.00	0.00	0.00	0.
1.01	3.40	44	.85	.84	.01	954.	1.01	7.25	89	0.00	0.00	0.00	0.
1.01	3.45	45	.54	.53	.01	808.	1.01	7.30	90	0.00	0.00	0.00	0.
									SUM	20.41	18.86	1.55	13166.
										(519.)(	479.)(	39.)(	372.82)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	954.	193.	146.	146.	13166.

CMS	27.	5.	4.	4.	373.	
INCHES		18.89	18.90	18.90	18.90	
MM		479.70	480.00	480.00	480.00	
AC-FT		91.	91.	91.	91.	
THOUS CU M		112.	112.	112.	112.	

HYDROGRAPH AT STA A2 FOR PLAN 1, RTIO 1

0.	0.	0.	0.	0.	3.	24.	64.	91.	103.
109.	111.	116.	125.	132.	134.	136.	136.	136.	137.
137.	137.	137.	137.	142.	155.	165.	169.	171.	172.
172.	172.	172.	172.	172.	172.	161.	153.	174.	212.
269.	410.	732.	954.	908.	575.	421.	316.	250.	206.
181.	169.	164.	162.	161.	161.	161.	161.	161.	161.
155.	142.	132.	128.	126.	126.	125.	125.	125.	125.
125.	125.	105.	59.	26.	12.	6.	3.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	954.	183.	146.	146.	13164.
CMS	27.	5.	4.	4.	373.
INCHES		18.89	18.90	18.90	18.90
MM		479.70	480.00	480.00	480.00
AC-FT		91.	91.	91.	91.
THOUS CU M		112.	112.	112.	112.

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COMBINE HYDROGRAPHS

DEVELOP COMBINE INFLOW HYDROGRAPH FOR CRYSTAL LAKE DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A3	2	0	0	0	1	1	0	0

SUM OF 2 HYDROGRAPHS AT A3 PLAN 1 RTIO 1

0.	0.	0.	0.	0.	3.	24.	65.	93.	106.
112.	116.	121.	131.	138.	140.	142.	142.	143.	144.
147.	150.	154.	159.	167.	185.	203.	214.	221.	230.
232.	235.	238.	241.	244.	246.	237.	231.	254.	294.
353.	525.	1042.	1634.	1598.	1255.	891.	626.	500.	356.
296.	259.	248.	244.	241.	239.	237.	235.	233.	231.
223.	208.	196.	188.	182.	178.	173.	169.	165.	161.
157.	153.	129.	81.	41.	22.	13.	9.	7.	7.
6.	6.	6.	6.	6.	6.	6.	6.	6.	6.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1634.	272.	218.	218.	19662.
CMS	46.	8.	6.	6.	557.
INCHES		8.72	8.76	8.76	8.76
MM		221.59	222.50	222.50	222.50
AC-FT		135.	135.	135.	135.
THOUS CU M		166.	167.	167.	167.

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HYDROGRAPH ROUTING

ROUTE INFLOW HYDROGRAPH THROUGH IMPOUNDMENT

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
AA	1	0	0	0	1	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-535.	-1

STAGE	535.10	535.20	535.40	535.60	535.80	536.00	536.20	536.40	536.60	536.80
	537.00	537.50	538.00	539.00	540.00					
FLOW	0.00	.25	1.30	2.78	4.61	6.70	23.00	72.00	164.00	360.00
	456.00	985.00	1750.00	3650.00	6280.00					
CAPACITY=	116.	125.	135.	146.	160.	170.	199.	211.		
ELEVATION=	535.	536.	536.	537.	538.	539.	539.	540.		

CREL	SPWID	COQW	EXPW	FLEVL	COQL	CAREA	EXPL
536.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
536.0	0.0	0.0	0.

STATION AA, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

MO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	.05	1	.08	0.	0.	118.	535.2
1.01	.10	2	.17	0.	0.	118.	535.2
1.01	.15	3	.25	0.	0.	118.	535.2
1.01	.20	4	.33	0.	0.	118.	535.2
1.01	.25	5	.42	0.	0.	118.	535.2
1.01	.30	6	.50	3.	0.	118.	535.2
1.01	.35	7	.58	24.	0.	118.	535.2
1.01	.40	8	.67	65.	0.	118.	535.2
1.01	.45	9	.75	93.	1.	119.	535.2
1.01	.50	10	.83	106.	1.	119.	535.3
1.01	.55	11	.92	112.	1.	120.	535.3
1.01	1.00	12	1.00	116.	1.	121.	535.4
1.01	1.05	13	1.08	121.	1.	122.	535.4
1.01	1.10	14	1.17	131.	2.	123.	535.4
1.01	1.15	15	1.25	138.	2.	123.	535.5
1.01	1.20	16	1.33	140.	2.	124.	535.5
1.01	1.25	17	1.42	142.	3.	125.	535.6
1.01	1.30	18	1.50	142.	3.	126.	535.6
1.01	1.35	19	1.58	143.	3.	127.	535.7

1.01	1.40	20	1.67	144.	4.	120.	535.7
1.01	1.45	21	1.75	147.	4.	129.	535.8
1.01	1.50	22	1.83	150.	5.	130.	535.8
1.01	1.55	23	1.92	154.	5.	131.	535.8
1.01	2.00	24	2.00	159.	6.	132.	535.9
1.01	2.05	25	2.08	167.	6.	133.	535.9
1.01	2.10	26	2.17	185.	7.	134.	536.0
1.01	2.15	27	2.25	203.	11.	136.	536.1
1.01	2.20	28	2.33	214.	17.	137.	536.1
1.01	2.25	29	2.42	221.	23.	138.	536.2
1.01	2.30	30	2.50	230.	39.	140.	536.3
1.01	2.35	31	2.58	232.	55.	141.	536.3
1.01	2.40	32	2.67	235.	70.	142.	536.4
1.01	2.45	33	2.75	238.	93.	143.	536.4
1.01	2.50	34	2.83	241.	116.	144.	536.5
1.01	2.55	35	2.92	244.	135.	145.	536.5
1.01	3.00	36	3.00	246.	152.	146.	536.6
1.01	3.05	37	3.08	237.	165.	146.	536.6
1.01	3.10	38	3.17	231.	178.	147.	536.6
1.01	3.15	39	3.25	254.	190.	147.	536.6
1.01	3.20	40	3.33	294.	206.	148.	536.7
1.01	3.25	41	3.42	353.	228.	148.	536.7
1.01	3.30	42	3.50	525.	260.	150.	536.7
1.01	3.35	43	3.58	1042.	367.	153.	536.9
1.01	3.40	44	3.67	1634.	553.	159.	537.3
1.01	3.45	45	3.75	1598.	806.	165.	537.4
1.01	3.50	46	3.83	1255.	1030.	168.	537.5
1.01	3.55	47	3.92	891.	1047.	168.	537.5
1.01	4.00	48	4.00	626.	950.	167.	537.5
1.01	4.05	49	4.08	500.	847.	164.	537.4
1.01	4.10	50	4.17	356.	735.	162.	537.3
1.01	4.15	51	4.25	296.	626.	159.	537.2
1.01	4.20	52	4.33	259.	533.	157.	537.1
1.01	4.25	53	4.42	248.	458.	156.	537.0
1.01	4.30	54	4.50	244.	416.	154.	536.9
1.01	4.35	55	4.58	241.	383.	153.	536.9
1.01	4.40	56	4.67	239.	355.	152.	536.9
1.01	4.45	57	4.75	237.	332.	152.	536.8
1.01	4.50	58	4.83	235.	313.	151.	536.8
1.01	4.55	59	4.92	233.	298.	151.	536.8
1.01	5.00	60	5.00	231.	285.	150.	536.8
1.01	5.05	61	5.08	223.	274.	150.	536.8
1.01	5.10	62	5.17	208.	263.	149.	536.7
1.01	5.15	63	5.25	196.	252.	149.	536.7
1.01	5.20	64	5.33	188.	240.	149.	536.7
1.01	5.25	65	5.42	182.	230.	148.	536.7
1.01	5.30	66	5.50	178.	220.	148.	536.7
1.01	5.35	67	5.58	173.	212.	148.	536.7
1.01	5.40	68	5.67	169.	204.	148.	536.7
1.01	5.45	69	5.75	165.	197.	147.	536.6
1.01	5.50	70	5.83	161.	191.	147.	536.6
1.01	5.55	71	5.92	157.	185.	147.	536.6
1.01	6.00	72	6.00	153.	179.	147.	536.6
1.01	6.05	73	6.08	129.	172.	146.	536.6
1.01	6.10	74	6.17	81.	160.	146.	536.6
1.01	6.15	75	6.25	41.	145.	145.	536.6
1.01	6.20	76	6.33	22.	128.	145.	536.5
1.01	6.25	77	6.42	13.	111.	144.	536.5
1.01	6.30	78	6.50	9.	96.	143.	536.5
1.01	6.35	79	6.58	7.	83.	143.	536.4

1.01	6.40	80	6.67	7.	72.	142.	536.4
1.01	6.45	81	6.75	6.	67.	142.	536.4
1.01	6.50	82	6.83	6.	62.	142.	536.4
1.01	6.55	83	6.92	6.	57.	141.	536.3
1.01	7.00	84	7.00	6.	53.	141.	536.3
1.01	7.05	85	7.08	6.	50.	141.	536.3
1.01	7.10	86	7.17	6.	46.	140.	536.3
1.01	7.15	87	7.25	6.	43.	140.	536.3
1.01	7.20	88	7.33	6.	40.	140.	536.3
1.01	7.25	89	7.42	6.	37.	140.	536.3
1.01	7.30	90	7.50	6.	35.	139.	536.2

PEAK OUTFLOW IS 1047. AT TIME 3.92 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1047.	229.	184.	184.	16526.
CMS	30.	6.	5.	5.	468.
INCHES		7.35	7.36	7.36	7.36
MM		186.81	187.01	187.01	187.01
AC-FT		114.	114.	114.	114.
THOUS CU M		140.	140.	140.	140.

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SUB-AREA RUNOFF COMPUTATION

DEVELOP INFLOW HYDROGRAPH FOR INTERMEDIATE DRAINAGE AREA FOR SUNSET LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A5	0	0	0	0	1	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	2	.08	0.00	.08	.80	0.000	0	1	0

PRECIP DATA

MP	STORM	DAJ	DAK
72	0.00	0.00	0.00

PRECIP PATTERN

.21	.21	.21	.21	.21	.21	.21	.21	.21	.21
.21	.21	.26	.26	.26	.26	.26	.26	.26	.26
.26	.26	.26	.26	.32	.32	.32	.32	.32	.32
.32	.32	.32	.32	.32	.32	.19	.39	.39	.58
.68	1.65	2.71	1.07	.68	.58	.39	.39	.39	.39
.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
.23	.23	.23	.23	.23	.23	.23	.23	.23	.23
.23	.23								

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.01	.10	0.00	0.00

UNIT HYDROGRAPH DATA

TC= 0.00 LAG= .21

RECESSION DATA
STRTQ= -3.00 QRCSN= 0.00 RTIOR= 1.00

UNIT HYDROGRAPH 17 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .25 VOL= 1.00

23.	80.	128.	128.	100.	60.	37.	24.	15.	9.			
6.	4.	2.	1.	1.	1.	0.						

						END-OF-PERIOD FLOW						
MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.17	0.00	.17	0.	1.01	3.50	46	.46	.46	.01	674.
1.01	.10	2	.17	0.00	.17	0.	1.01	3.55	47	.31	.30	.01	556.
1.01	.15	3	.17	0.00	.17	0.	1.01	4.00	48	.31	.30	.01	446.
1.01	.20	4	.17	0.00	.17	0.	1.01	4.05	49	.24	.23	.01	356.
1.01	.25	5	.17	0.00	.17	0.	1.01	4.10	50	.24	.23	.01	292.
1.01	.30	6	.17	.02	.15	1.	1.01	4.15	51	.24	.23	.01	240.
1.01	.35	7	.17	.16	.01	6.	1.01	4.20	52	.24	.23	.01	205.
1.01	.40	8	.17	.16	.01	20.	1.01	4.25	53	.24	.23	.01	182.
1.01	.45	9	.17	.16	.01	40.	1.01	4.30	54	.24	.23	.01	167.
1.01	.50	10	.17	.16	.01	61.	1.01	4.35	55	.24	.23	.01	155.
1.01	.55	11	.17	.16	.01	76.	1.01	4.40	56	.24	.23	.01	152.
1.01	1.00	12	.17	.16	.01	85.	1.01	4.45	57	.24	.23	.01	149.
1.01	1.05	13	.20	.20	.01	92.	1.01	4.50	58	.24	.23	.01	146.
1.01	1.10	14	.20	.20	.01	98.	1.01	4.55	59	.24	.23	.01	144.
1.01	1.15	15	.20	.20	.01	105.	1.01	5.00	60	.24	.23	.01	143.
1.01	1.20	16	.20	.20	.01	110.	1.01	5.05	61	.19	.18	.01	142.
1.01	1.25	17	.20	.20	.01	115.	1.01	5.10	62	.19	.18	.01	137.
1.01	1.30	18	.20	.20	.01	117.	1.01	5.15	63	.19	.18	.01	131.
1.01	1.35	19	.20	.20	.01	119.	1.01	5.20	64	.19	.18	.01	124.
1.01	1.40	20	.20	.20	.01	120.	1.01	5.25	65	.19	.18	.01	119.
1.01	1.45	21	.20	.20	.01	120.	1.01	5.30	66	.19	.18	.01	116.
1.01	1.50	22	.20	.20	.01	121.	1.01	5.35	67	.19	.18	.01	114.
1.01	1.55	23	.20	.20	.01	121.	1.01	5.40	68	.19	.18	.01	113.
1.01	2.00	24	.20	.20	.01	121.	1.01	5.45	69	.19	.18	.01	112.
1.01	2.05	25	.26	.25	.01	122.	1.01	5.50	70	.19	.18	.01	112.
1.01	2.10	26	.26	.25	.01	127.	1.01	5.55	71	.19	.18	.01	111.
1.01	2.15	27	.26	.25	.01	133.	1.01	6.00	72	.19	.18	.01	111.
1.01	2.20	28	.26	.25	.01	140.	1.01	6.05	73	0.00	0.00	0.00	107.
1.01	2.25	29	.26	.25	.01	145.	1.01	6.10	74	0.00	0.00	0.00	93.
1.01	2.30	30	.26	.25	.01	148.	1.01	6.15	75	0.00	0.00	0.00	78.
1.01	2.35	31	.26	.25	.01	150.	1.01	6.20	76	0.00	0.00	0.00	67.
1.01	2.40	32	.26	.25	.01	151.	1.01	6.25	77	0.00	0.00	0.00	59.
1.01	2.45	33	.26	.25	.01	152.	1.01	6.30	78	0.00	0.00	0.00	52.
1.01	2.50	34	.26	.25	.01	152.	1.01	6.35	79	0.00	0.00	0.00	46.
1.01	2.55	35	.26	.25	.01	153.	1.01	6.40	80	0.00	0.00	0.00	41.
1.01	3.00	36	.26	.25	.01	153.	1.01	6.45	81	0.00	0.00	0.00	36.
1.01	3.05	37	.16	.15	.01	151.	1.01	6.50	82	0.00	0.00	0.00	32.
1.01	3.10	38	.31	.30	.01	146.	1.01	6.55	83	0.00	0.00	0.00	28.
1.01	3.15	39	.31	.30	.01	146.	1.01	7.00	84	0.00	0.00	0.00	25.
1.01	3.20	40	.46	.46	.01	157.	1.01	7.05	85	0.00	0.00	0.00	22.
1.01	3.25	41	.54	.53	.01	191.	1.01	7.10	86	0.00	0.00	0.00	19.
1.01	3.30	42	1.32	1.31	.01	234.	1.01	7.15	87	0.00	0.00	0.00	17.
1.01	3.35	43	2.17	2.16	.01	352.	1.01	7.20	88	0.00	0.00	0.00	15.
1.01	3.40	44	.85	.84	.01	517.	1.01	7.25	89	0.00	0.00	0.00	13.
1.01	3.45	45	.54	.53	.01	631.	1.01	7.30	90	0.00	0.00	0.00	12.
									SUM	20.41	18.86	1.55	11652.
										(519.)(	479.)(	39.)(	331.2mm)

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME

CFS	634.	162.	130.	130.	11702.	
CMS	18.	5.	4.	4.	331.	
INCHES		18.85	18.90	18.90	18.90	
MM		478.74	480.00	480.00	480.00	
AC-FT		80.	81.	81.	81.	
THOUS CU M		99.	99.	99.	99.	

HYDROGRAPH AT STA AS FOR PLAN 1, RTIO 1

0.	0.	0.	0.	0.	1.	6.	20.	40.	61.
76.	85.	92.	98.	105.	110.	115.	117.	119.	120.
120.	121.	121.	121.	122.	127.	133.	140.	145.	148.
150.	151.	152.	152.	153.	153.	151.	146.	146.	157.
181.	234.	352.	517.	631.	634.	555.	446.	358.	292.
240.	205.	182.	167.	158.	152.	149.	146.	144.	143.
142.	138.	131.	124.	119.	116.	114.	113.	112.	112.
111.	111.	107.	93.	70.	47.	29.	18.	12.	7.
5.	3.	2.	1.	1.	1.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	634.	162.	130.	130.	11702.
CMS	18.	5.	4.	4.	331.
INCHES		18.85	18.90	18.90	18.90
MM		478.74	480.00	480.00	480.00
AC-FT		80.	81.	81.	81.
THOUS CU M		99.	99.	99.	99.

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COMBINE HYDROGRAPHS

DEVELOP COMBINE INFLOW HYDROGRAPH FOR SUNSET LAKE DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	TAUTO
AE	2	0	0	0	1	1	0	0

SUM OF 2 HYDROGRAPHS AT AE FOR PLAN 1 RTIO 1

0.	0.	0.	0.	0.	1.	6.	20.	41.	61.
77.	86.	93.	100.	107.	113.	117.	120.	122.	124.
125.	126.	126.	127.	129.	133.	144.	157.	168.	187.
205.	221.	245.	268.	287.	304.	315.	324.	336.	363.
409.	503.	719.	1111.	1498.	1665.	1602.	1396.	1205.	1027.
866.	738.	640.	584.	541.	507.	481.	460.	443.	429.
416.	401.	382.	365.	348.	337.	328.	317.	309.	302.
296.	290.	279.	253.	215.	175.	140.	114.	95.	79.
71.	65.	59.	55.	50.	47.	43.	40.	37.	35.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1665.	385.	314.	314.	28227.
CMS	47.	11.	9.	9.	799.
INCHES		9.69	9.86	9.86	9.86
MM		246.08	250.36	250.36	250.36
AC-FT		191.	194.	194.	194.
THOUS CU M		236.	240.	240.	240.

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HYDROGRAPH ROUTING

ROUTE HYDROGRAPH THROUGH IMPOUNDMENT

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A7	1	0	0	0	1	1	0	0

ROUTING DATA

OLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IETA	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-522.	-1

STAGE	522.20	522.30	522.50	523.00	523.50	524.00	524.50	525.00
FLOW	0.00	.80	6.30	142.00	453.00	567.00	2095.00	2503.00
CAPACITY=	74.	74.	103.					
ELEVATION=	522.	522.	524.					

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
522.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
522.3	0.0	0.0	0.

STATION A7, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

MO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	.05	1	.08	0.	1.	74.	522.3
1.01	.10	2	.17	0.	1.	74.	522.3
1.01	.15	3	.25	0.	1.	74.	522.3
1.01	.20	4	.33	0.	1.	74.	522.3
1.01	.25	5	.42	0.	1.	74.	522.3
1.01	.30	6	.50	1.	1.	74.	522.3
1.01	.35	7	.58	6.	1.	74.	522.3
1.01	.40	8	.67	20.	1.	74.	522.3
1.01	.45	9	.75	41.	1.	74.	522.3
1.01	.50	10	.83	61.	2.	75.	522.3
1.01	.55	11	.92	77.	3.	75.	522.4
1.01	1.00	12	1.00	86.	3.	76.	522.4
1.01	1.05	13	1.08	93.	4.	76.	522.4
1.01	1.10	14	1.17	100.	5.	77.	522.5
1.01	1.15	15	1.25	107.	8.	78.	522.5
1.01	1.20	16	1.33	113.	18.	78.	522.5
1.01	1.25	17	1.42	117.	28.	79.	522.6
1.01	1.30	18	1.50	120.	38.	79.	522.6
1.01	1.35	19	1.58	122.	46.	80.	522.6
1.01	1.40	20	1.67	124.	54.	80.	522.7

1.01	1.45	21	1.75	125.	62.	81.	522.7
1.01	1.50	22	1.83	126.	68.	81.	522.7
1.01	1.55	23	1.92	126.	74.	82.	522.8
1.01	2.00	24	2.00	127.	80.	82.	522.8
1.01	2.05	25	2.08	129.	85.	82.	522.8
1.01	2.10	26	2.17	133.	89.	83.	522.8
1.01	2.15	27	2.25	144.	94.	83.	522.8
1.01	2.20	28	2.33	157.	100.	83.	522.8
1.01	2.25	29	2.42	168.	107.	84.	522.9
1.01	2.30	30	2.50	187.	114.	84.	522.9
1.01	2.35	31	2.58	205.	122.	85.	522.9
1.01	2.40	32	2.67	221.	132.	85.	523.0
1.01	2.45	33	2.75	245.	142.	86.	523.0
1.01	2.50	34	2.83	268.	168.	87.	523.0
1.01	2.55	35	2.92	287.	192.	87.	523.1
1.01	3.00	36	3.00	304.	215.	88.	523.1
1.01	3.05	37	3.08	315.	236.	89.	523.2
1.01	3.10	38	3.17	324.	255.	89.	523.2
1.01	3.15	39	3.25	336.	272.	89.	523.2
1.01	3.20	40	3.33	363.	289.	90.	523.2
1.01	3.25	41	3.42	409.	310.	91.	523.3
1.01	3.30	42	3.50	503.	342.	91.	523.3
1.01	3.35	43	3.58	719.	402.	93.	523.4
1.01	3.40	44	3.67	1111.	551.	96.	523.6
1.01	3.45	45	3.75	1498.	810.	100.	523.8
1.01	3.50	46	3.83	1665.	1164.	104.	524.1
1.01	3.55	47	3.92	1602.	1458.	107.	524.2
1.01	4.00	48	4.00	1396.	1483.	107.	524.2
1.01	4.05	49	4.08	1205.	1369.	106.	524.2
1.01	4.10	50	4.17	1027.	1211.	105.	524.1
1.01	4.15	51	4.25	866.	1045.	104.	524.0
1.01	4.20	52	4.33	738.	926.	102.	524.0
1.01	4.25	53	4.42	640.	845.	101.	523.9
1.01	4.30	54	4.50	584.	765.	100.	523.8
1.01	4.35	55	4.58	541.	695.	98.	523.7
1.01	4.40	56	4.67	507.	637.	98.	523.7
1.01	4.45	57	4.75	481.	588.	97.	523.6
1.01	4.50	58	4.83	460.	548.	96.	523.6
1.01	4.55	59	4.92	443.	515.	95.	523.6
1.01	5.00	60	5.00	429.	488.	95.	523.5
1.01	5.05	61	5.08	416.	466.	95.	523.5
1.01	5.10	62	5.17	401.	449.	94.	523.5
1.01	5.15	63	5.25	382.	436.	94.	523.5
1.01	5.20	64	5.33	365.	423.	94.	523.5
1.01	5.25	65	5.42	349.	408.	93.	523.4
1.01	5.30	66	5.50	337.	394.	93.	523.4
1.01	5.35	67	5.58	326.	380.	92.	523.4
1.01	5.40	68	5.67	317.	367.	92.	523.4
1.01	5.45	69	5.75	309.	355.	92.	523.3
1.01	5.50	70	5.83	302.	345.	91.	523.3
1.01	5.55	71	5.92	296.	335.	91.	523.3
1.01	6.00	72	6.00	290.	325.	91.	523.3
1.01	6.05	73	6.08	279.	316.	91.	523.3
1.01	6.10	74	6.17	253.	305.	90.	523.3
1.01	6.15	75	6.25	215.	289.	90.	523.2
1.01	6.20	76	6.33	175.	269.	89.	523.2
1.01	6.25	77	6.42	140.	244.	89.	523.2
1.01	6.30	78	6.50	114.	218.	88.	523.1
1.01	6.35	79	6.58	95.	193.	87.	523.1
1.01	6.40	80	6.67	79.	169.	87.	523.0

1.01	6.45	81	6.75	71.	148.	86.	523.0
1.01	6.50	82	6.83	65.	137.	86.	523.0
1.01	6.55	83	6.92	59.	129.	85.	523.0
1.01	7.00	84	7.00	55.	122.	85.	522.9
1.01	7.05	85	7.08	50.	114.	84.	522.9
1.01	7.10	86	7.17	47.	108.	84.	522.9
1.01	7.15	87	7.25	43.	101.	83.	522.8
1.01	7.20	88	7.33	40.	95.	83.	522.8
1.01	7.25	89	7.42	37.	89.	83.	522.8
1.01	7.30	90	7.50	35.	84.	82.	522.8

PEAK OUTFLOW IS 1483. AT TIME 4.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1483.	374.	300.	300.	2703.
CMS	42.	11.	9.	9.	766.
INCHES		9.41	9.44	9.44	9.44
MM		239.03	239.81	239.81	239.81
AC-FT		186.	186.	186.	186.
THOUS CU M		229.	230.	230.	230.

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HYDROGRAPH ROUTING

ROUTE OUTFLOW TO INLET OF MOUNTAIN LAKE

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
AB	1	0	0	0	1	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTPL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0500	.3500	.0500	489.1	510.0	2000.	.01660

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 510.00 100.00 500.00 800.00 500.00 800.00 489.10 885.00 489.10
985.00 500.00 1185.00 500.00 1585.00 510.00

STORAGE	0.00	.71	2.34	4.89	8.35	12.72	18.03	24.29	31.48	39.63
	52.54	108.88	167.83	229.39	293.57	360.35	429.75	501.76	576.37	653.60
OUTFLOW	0.00	6.47	32.00	85.62	175.08	307.37	488.95	725.96	1023.55	1380.39

	1909.85	7200.40	17343.56	31488.10	49325.75	70705.78	95550.50	123822.94	155511.28	190620.38
STAGE	489.10	490.20	491.30	492.40	493.50	494.60	495.70	496.80	497.90	499.00
	500.10	501.20	502.30	503.40	504.50	505.60	506.70	507.80	508.90	510.00
FLOW	0.00	6.47	32.00	85.62	175.08	307.37	488.95	725.86	1023.85	1382.39
	1909.85	7200.40	17343.56	31488.10	49325.75	70705.78	95550.50	123822.94	155511.28	190620.38

0

MO.DA	HR.MN	PERIOD	EOP STOR	AVG IN	EOP OUT	STAGE	AVG PUMP
1.01	.05	1	0.	1.	1.	489.2	0.
1.01	.10	2	0.	1.	1.	489.2	0.
1.01	.15	3	0.	1.	1.	489.2	0.
1.01	.20	4	0.	1.	1.	489.2	0.
1.01	.25	5	0.	1.	1.	489.2	0.
1.01	.30	6	0.	1.	1.	489.2	0.
1.01	.35	7	0.	1.	1.	489.2	0.
1.01	.40	8	0.	1.	1.	489.2	0.
1.01	.45	9	0.	1.	1.	489.2	0.
1.01	.50	10	0.	2.	1.	489.2	0.
1.01	.55	11	0.	2.	1.	489.3	0.
1.01	1.00	12	0.	3.	1.	489.3	0.
1.01	1.05	13	0.	4.	1.	489.3	0.
1.01	1.10	14	0.	5.	1.	489.3	0.
1.01	1.15	15	0.	7.	2.	489.4	0.
1.01	1.20	16	0.	13.	2.	489.5	0.
1.01	1.25	17	0.	23.	4.	489.7	0.
1.01	1.30	18	1.	33.	6.	490.0	0.
1.01	1.35	19	1.	42.	9.	490.3	0.
1.01	1.40	20	1.	50.	13.	490.5	0.
1.01	1.45	21	1.	58.	18.	490.7	0.
1.01	1.50	22	2.	65.	22.	490.9	0.
1.01	1.55	23	2.	71.	27.	491.1	0.
1.01	2.00	24	2.	77.	33.	491.3	0.
1.01	2.05	25	3.	82.	39.	491.4	0.
1.01	2.10	26	3.	87.	46.	491.6	0.
1.01	2.15	27	3.	92.	52.	491.7	0.
1.01	2.20	28	4.	97.	58.	491.8	0.
1.01	2.25	29	4.	103.	64.	492.0	0.
1.01	2.30	30	4.	110.	70.	492.1	0.
1.01	2.35	31	4.	118.	77.	492.2	0.
1.01	2.40	32	5.	127.	84.	492.4	0.
1.01	2.45	33	5.	137.	92.	492.5	0.
1.01	2.50	34	6.	155.	102.	492.6	0.
1.01	2.55	35	6.	180.	115.	492.8	0.
1.01	3.00	36	7.	204.	130.	492.9	0.
1.01	3.05	37	7.	226.	145.	493.1	0.
1.01	3.10	38	8.	246.	162.	493.3	0.
1.01	3.15	39	8.	263.	179.	493.5	0.
1.01	3.20	40	9.	280.	198.	493.7	0.
1.01	3.25	41	10.	300.	217.	493.8	0.
1.01	3.30	42	10.	326.	238.	494.0	0.
1.01	3.35	43	11.	372.	263.	494.2	0.
1.01	3.40	44	13.	477.	303.	494.6	0.
1.01	3.45	45	15.	681.	382.	495.1	0.
1.01	3.50	46	19.	987.	512.	495.8	0.
1.01	3.55	47	24.	1311.	698.	496.7	0.
1.01	4.00	48	28.	1470.	890.	497.4	0.
1.01	4.05	49	31.	1426.	1025.	497.9	0.

1.01	4.10	50	33.	1290.	1096.	498.1	0.
1.01	4.15	51	33.	1128.	1105.	498.1	0.
1.01	4.20	52	32.	986.	1073.	498.0	0.
1.01	4.25	53	31.	886.	1022.	497.9	0.
1.01	4.30	54	30.	805.	968.	497.7	0.
1.01	4.35	55	29.	730.	908.	497.5	0.
1.01	4.40	56	27.	666.	847.	497.2	0.
1.01	4.45	57	26.	612.	788.	497.0	0.
1.01	4.50	58	24.	568.	733.	496.8	0.
1.01	4.55	59	23.	531.	685.	496.6	0.
1.01	5.00	60	22.	501.	643.	496.4	0.
1.01	5.05	61	21.	477.	604.	496.2	0.
1.01	5.10	62	20.	457.	570.	496.1	0.
1.01	5.15	63	19.	442.	540.	495.9	0.
1.01	5.20	64	19.	429.	515.	495.8	0.
1.01	5.25	65	18.	415.	492.	495.7	0.
1.01	5.30	66	18.	401.	472.	495.6	0.
1.01	5.35	67	17.	387.	454.	495.5	0.
1.01	5.40	68	17.	374.	437.	495.4	0.
1.01	5.45	69	16.	361.	421.	495.3	0.
1.01	5.50	70	16.	350.	406.	495.2	0.
1.01	5.55	71	15.	340.	392.	495.1	0.
1.01	6.00	72	15.	330.	379.	495.0	0.
1.01	6.05	73	14.	321.	367.	495.0	0.
1.01	6.10	74	14.	311.	355.	494.9	0.
1.01	6.15	75	14.	297.	343.	494.8	0.
1.01	6.20	76	13.	279.	329.	494.7	0.
1.01	6.25	77	13.	256.	314.	494.6	0.
1.01	6.30	78	12.	231.	298.	494.5	0.
1.01	6.35	79	12.	205.	280.	494.4	0.
1.01	6.40	80	11.	181.	262.	494.2	0.
1.01	6.45	81	11.	159.	242.	494.1	0.
1.01	6.50	82	10.	143.	223.	493.9	0.
1.01	6.55	83	9.	133.	206.	493.8	0.
1.01	7.00	84	9.	125.	191.	493.6	0.
1.01	7.05	85	8.	118.	177.	493.5	0.
1.01	7.10	86	8.	111.	166.	493.4	0.
1.01	7.15	87	8.	104.	156.	493.3	0.
1.01	7.20	88	7.	98.	147.	493.1	0.
1.01	7.25	89	7.	92.	138.	493.0	0.
1.01	7.30	90	7.	86.	129.	492.9	0.
				SUM	26160.		
				(	740.78)		

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1105.	362.	290.	290.	26095.
CMS	31.	10.	8.	8.	739.
INCHES		9.10	9.11	9.11	9.11
MM		231.24	231.45	231.45	231.45
AC-FT		180.	180.	180.	180.
THOUS CU M		221.	222.	222.	222.

MAXIMUM STORAGE = 33.

MAXIMUM STAGE IS 498.1

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SUB-AREA RUNOFF COMPUTATION

DEVELOP INFLOW HYDROGRAPH FOR INTERMEDIATE DRAINAGE AREA FOR WILDWOOD LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A9	0	0	0	0	1	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	2	.90	0.00	.90	.80	0.000	0	1	0

PRECIP DATA

MP	STORM	DAD	DAK
72	0.00	0.00	0.00

PRECIP PATTERN

.21	.21	.21	.21	.21	.21	.21	.21	.21	.21
.21	.21	.26	.26	.26	.26	.26	.26	.26	.26
.26	.26	.26	.26	.32	.32	.32	.32	.32	.32
.32	.32	.32	.32	.32	.32	.39	.39	.39	.59
.68	1.65	2.71	1.07	.68	.59	.39	.39	.30	.30
.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
.23	.23	.23	.23	.23	.23	.23	.23	.23	.23
.23	.23								

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.10	0.00	0.00

UNIT HYDROGRAPH DATA

TC= 0.00 LAG= .33

RECESSION DATA

STRTQ= -3.00 QRCSN= 0.00 RTIOR= 1.00

UNIT HYDROGRAPH 22 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .33 VOL= 1.00

142.	453.	907.	1154.	1142.	962.	697.	461.	319.	227.
156.	109.	75.	52.	36.	25.	17.	12.	8.	6.
3.	1.								

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.17	0.00	.17	3.	1.01	3.50	46	.46	.46	.01	6290.
1.01	.10	2	.17	0.00	.17	3.	1.01	3.55	47	.31	.30	.01	6295.
1.01	.15	3	.17	0.00	.17	3.	1.01	4.00	48	.31	.30	.01	5751.
1.01	.20	4	.17	0.00	.17	3.	1.01	4.05	49	.24	.23	.01	4818.
1.01	.25	5	.17	0.00	.17	3.	1.01	4.10	50	.24	.23	.01	4083.
1.01	.30	6	.17	.02	.15	6.	1.01	4.15	51	.24	.23	.01	3425.
1.01	.35	7	.17	.16	.01	35.	1.01	4.20	52	.24	.23	.01	2913.
1.01	.40	8	.17	.16	.01	118.	1.01	4.25	53	.24	.23	.01	2523.
1.01	.45	9	.17	.16	.01	271.	1.01	4.30	54	.24	.23	.01	2244.
1.01	.50	10	.17	.16	.01	457.	1.01	4.35	55	.24	.23	.01	2047.
1.01	.55	11	.17	.16	.01	639.	1.01	4.40	56	.24	.23	.01	1912.
1.01	1.00	12	.17	.16	.01	789.	1.01	4.45	57	.24	.23	.01	1818.
1.01	1.05	13	.20	.20	.01	902.	1.01	4.50	58	.24	.23	.01	1753.
1.01	1.10	14	.20	.20	.01	980.	1.01	4.55	59	.24	.23	.01	1708.

1.01	1.15	15	.20	.20	.01	1069.	1.01	5.00	60	.24	.23	.01	1677.
1.01	1.20	16	.20	.20	.01	1143.	1.01	5.05	61	.19	.18	.01	1648.
1.01	1.25	17	.20	.20	.01	1205.	1.01	5.10	62	.19	.18	.01	1608.
1.01	1.30	18	.20	.20	.01	1255.	1.01	5.15	63	.19	.18	.01	1548.
1.01	1.35	19	.20	.20	.01	1290.	1.01	5.20	64	.19	.18	.01	1479.
1.01	1.40	20	.20	.20	.01	1313.	1.01	5.25	65	.19	.18	.01	1415.
1.01	1.45	21	.20	.20	.01	1330.	1.01	5.30	66	.19	.18	.01	1364.
1.01	1.50	22	.20	.20	.01	1341.	1.01	5.35	67	.19	.18	.01	1327.
1.01	1.55	23	.20	.20	.01	1349.	1.01	5.40	68	.19	.18	.01	1303.
1.01	2.00	24	.20	.20	.01	1355.	1.01	5.45	69	.19	.18	.01	1286.
1.01	2.05	25	.26	.25	.01	1366.	1.01	5.50	70	.19	.18	.01	1274.
1.01	2.10	26	.26	.25	.01	1392.	1.01	5.55	71	.19	.18	.01	1266.
1.01	2.15	27	.26	.25	.01	1440.	1.01	6.00	72	.19	.18	.01	1261.
1.01	2.20	28	.26	.25	.01	1500.	1.01	6.05	73	0.00	0.00	0.00	1232.
1.01	2.25	29	.26	.25	.01	1559.	1.01	6.10	74	0.00	0.00	0.00	1148.
1.01	2.30	30	.26	.25	.01	1609.	1.01	6.15	75	0.00	0.00	0.00	984.
1.01	2.35	31	.26	.25	.01	1645.	1.01	6.20	76	0.00	0.00	0.00	776.
1.01	2.40	32	.26	.25	.01	1669.	1.01	6.25	77	0.00	0.00	0.00	571.
1.01	2.45	33	.26	.25	.01	1685.	1.01	6.30	78	0.00	0.00	0.00	398.
1.01	2.50	34	.26	.25	.01	1697.	1.01	6.35	79	0.00	0.00	0.00	273.
1.01	2.55	35	.26	.25	.01	1705.	1.01	6.40	80	0.00	0.00	0.00	191.
1.01	3.00	36	.26	.25	.01	1710.	1.01	6.45	81	0.00	0.00	0.00	133.
1.01	3.05	37	.16	.15	.01	1700.	1.01	6.50	82	0.00	0.00	0.00	93.
1.01	3.10	38	.31	.30	.01	1679.	1.01	6.55	83	0.00	0.00	0.00	65.
1.01	3.15	39	.31	.30	.01	1661.	1.01	7.00	84	0.00	0.00	0.00	45.
1.01	3.20	40	.46	.46	.01	1709.	1.01	7.05	85	0.00	0.00	0.00	32.
1.01	3.25	41	.54	.53	.01	1856.	1.01	7.10	86	0.00	0.00	0.00	22.
1.01	3.30	42	1.32	1.31	.01	2223.	1.01	7.15	87	0.00	0.00	0.00	16.
1.01	3.35	43	2.17	2.16	.01	3024.	1.01	7.20	88	0.00	0.00	0.00	11.
1.01	3.40	44	.85	.84	.01	4253.	1.01	7.25	89	0.00	0.00	0.00	8.
1.01	3.45	45	.54	.53	.01	5558.	1.01	7.30	90	0.00	0.00	0.00	6.
									SUM	20.41	18.86	1.55	131642.
										(518.5(	479.1(	39.1(	3727.6)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6295.	1819.	1463.	1463.	131638.
CMS	178.	52.	41.	41.	3728.
INCHES		18.81	18.90	18.90	18.90
MM		477.67	479.99	479.99	479.99
AC-FT		902.	907.	907.	907.
THOUS CU M		1113.	1118.	1118.	1118.

HYDROGRAPH AT STA A9 FOR PLAN 1, RTIO 1

3.	3.	3.	3.	3.	6.	35.	118.	271.	457.
639.	789.	902.	988.	1069.	1143.	1205.	1255.	1290.	1313.
1330.	1341.	1349.	1355.	1366.	1392.	1440.	1500.	1559.	1609.
1645.	1669.	1685.	1697.	1705.	1710.	1700.	1679.	1661.	1709.
1856.	2223.	3024.	4253.	5558.	6290.	6295.	5751.	4910.	4082.
3425.	2913.	2523.	2244.	2047.	1912.	1818.	1753.	1708.	1677.
1648.	1608.	1548.	1479.	1415.	1369.	1327.	1303.	1286.	1274.
1266.	1261.	1232.	1148.	984.	776.	571.	398.	273.	191.
133.	93.	65.	45.	32.	22.	16.	11.	8.	6.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6295.	1819.	1463.	1463.	131638.
CMS	178.	52.	41.	41.	3728.
INCHES		18.81	18.90	18.90	18.90

IN		477.67	479.00	479.00	479.00
AC-FT		902.	907.	907.	907.
THOUS CU M		1113.	1119.	1119.	1119.

COMBINE HYDROGRAPHS

DEVELOP COMBINE INFLOW HYDROGRAPH FOR WILDWOOD LAKE DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A10	2	0	0	0	1	1	0	0

SUM OF 2 HYDROGRAPHS AT A10 PLAN 1 RTIO 1

3.	3.	3.	3.	3.	7.	36.	119.	271.	458.
640.	790.	903.	990.	1070.	1145.	1209.	1260.	1298.	1326.
1347.	1364.	1377.	1387.	1405.	1438.	1492.	1558.	1623.	1679.
1722.	1752.	1777.	1799.	1820.	1840.	1845.	1841.	1839.	1907.
2073.	2461.	3287.	4557.	5940.	6802.	6992.	6641.	5935.	5179.
4530.	3986.	3546.	3212.	2955.	2759.	2606.	2486.	2393.	2320.
2253.	2178.	2089.	1994.	1907.	1836.	1781.	1740.	1707.	1681.
1659.	1640.	1598.	1503.	1327.	1106.	885.	696.	553.	452.
378.	316.	271.	236.	209.	189.	172.	158.	146.	136.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6992.	2159.	1753.	1753.	157733.
CMS	198.	61.	50.	50.	4466.
INCHES		15.82	16.05	16.05	16.05
HR		401.42	407.58	407.58	407.58
AC-FT		1071.	1086.	1086.	1086.
THOUS CU M		1321.	1340.	1340.	1340.

HYDROGRAPH ROUTING

ROUTE HYDROGRAPH THROUGH IMPOUNDMENT

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A11	1	0	0	0	1	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-999.	-1

STAGE	488.00	489.50	491.00	491.50	492.00	492.50	493.00	493.50
FLOW	0.00	4.60	7.10	37.00	50.00	152.00	574.00	2640.00	5480.00

CAPACITY=	835.	1065.	1141.	1256.
ELEVATION=	489.	492.	492.	494.

CREL	SPWID	COOW	EXPW	FLEVL	COOL	CAREA	EXPL
489.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COSD	EXPD	DAMWID
491.5	0.0	0.0	0.

STATION A11A PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

NO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	.05	1	.08	3.	1.	844.	489.1
1.01	.10	2	.17	3.	1.	844.	489.1
1.01	.15	3	.25	3.	1.	844.	489.1
1.01	.20	4	.33	3.	1.	844.	489.1
1.01	.25	5	.42	3.	1.	844.	489.1
1.01	.30	6	.50	7.	1.	844.	489.1
1.01	.35	7	.58	36.	1.	844.	489.1
1.01	.40	8	.67	119.	1.	845.	489.1
1.01	.45	9	.75	271.	1.	846.	489.1
1.01	.50	10	.83	458.	1.	849.	489.2
1.01	.55	11	.92	640.	2.	853.	489.2
1.01	1.00	12	1.00	790.	2.	858.	489.2
1.01	1.05	13	1.08	903.	3.	863.	489.3
1.01	1.10	14	1.17	990.	3.	870.	489.4
1.01	1.15	15	1.25	1070.	4.	877.	489.5
1.01	1.20	16	1.33	1145.	6.	884.	489.5
1.01	1.25	17	1.42	1209.	8.	893.	489.6
1.01	1.30	18	1.50	1260.	10.	901.	489.7
1.01	1.35	19	1.58	1298.	12.	910.	489.8
1.01	1.40	20	1.67	1326.	14.	919.	489.9
1.01	1.45	21	1.75	1347.	16.	928.	490.0
1.01	1.50	22	1.83	1364.	18.	937.	490.1
1.01	1.55	23	1.92	1377.	20.	946.	490.2
1.01	2.00	24	2.00	1387.	22.	956.	490.3
1.01	2.05	25	2.08	1405.	24.	965.	490.4
1.01	2.10	26	2.17	1438.	27.	975.	490.5
1.01	2.15	27	2.25	1492.	29.	985.	490.6
1.01	2.20	28	2.33	1558.	31.	995.	490.7
1.01	2.25	29	2.42	1623.	34.	1006.	490.9
1.01	2.30	30	2.50	1679.	36.	1017.	491.0
1.01	2.35	31	2.58	1722.	40.	1028.	491.1
1.01	2.40	32	2.67	1752.	43.	1040.	491.2
1.01	2.45	33	2.75	1777.	46.	1052.	491.4
1.01	2.50	34	2.83	1799.	50.	1064.	491.5
1.01	2.55	35	2.92	1820.	82.	1076.	491.6
1.01	3.00	36	3.00	1840.	118.	1088.	491.7
1.01	3.05	37	3.08	1845.	153.	1099.	491.9
1.01	3.10	38	3.17	1841.	187.	1111.	492.0
1.01	3.15	39	3.25	1839.	217.	1122.	492.1
1.01	3.20	40	3.33	1907.	454.	1132.	492.2
1.01	3.25	41	3.42	2073.	680.	1142.	492.3
1.01	3.30	42	3.50	2461.	926.	1152.	492.4
1.01	3.35	43	3.58	3207.	1203.	1165.	492.5
1.01	3.40	44	3.67	4557.	1502.	1181.	492.7

1.01	3.45	45	3.75	5340.	2463.	1202.	492.9
1.01	3.50	46	3.83	6802.	3652.	1225.	493.2
1.01	3.55	47	3.92	6992.	4752.	1244.	493.4
1.01	4.00	48	4.00	6641.	5452.	1256.	493.5
1.01	4.05	49	4.08	5935.	5735.	1260.	493.5
1.01	4.10	50	4.17	5179.	5675.	1259.	493.5
1.01	4.15	51	4.25	4530.	5396.	1255.	493.5
1.01	4.20	52	4.33	3986.	5010.	1248.	493.4
1.01	4.25	53	4.42	3546.	4588.	1241.	493.3
1.01	4.30	54	4.50	3212.	4178.	1234.	493.3
1.01	4.35	55	4.58	2955.	3807.	1228.	493.2
1.01	4.40	56	4.67	2759.	3485.	1222.	493.1
1.01	4.45	57	4.75	2606.	3213.	1218.	493.1
1.01	4.50	58	4.83	2486.	2987.	1214.	493.1
1.01	4.55	59	4.92	2393.	2801.	1211.	493.0
1.01	5.00	60	5.00	2320.	2651.	1208.	493.0
1.01	5.05	61	5.08	2253.	2577.	1206.	493.0
1.01	5.10	62	5.17	2178.	2508.	1204.	493.0
1.01	5.15	63	5.25	2089.	2436.	1201.	492.9
1.01	5.20	64	5.33	1994.	2361.	1199.	492.9
1.01	5.25	65	5.42	1907.	2283.	1196.	492.9
1.01	5.30	66	5.50	1836.	2204.	1194.	492.9
1.01	5.35	67	5.58	1781.	2129.	1191.	492.8
1.01	5.40	68	5.67	1740.	2058.	1189.	492.8
1.01	5.45	69	5.75	1707.	1995.	1187.	492.8
1.01	5.50	70	5.83	1681.	1937.	1185.	492.8
1.01	5.55	71	5.92	1659.	1886.	1184.	492.7
1.01	6.00	72	6.00	1640.	1841.	1182.	492.7
1.01	6.05	73	6.08	1598.	1798.	1181.	492.7
1.01	6.10	74	6.17	1503.	1751.	1179.	492.7
1.01	6.15	75	6.25	1327.	1687.	1177.	492.7
1.01	6.20	76	6.33	1106.	1597.	1174.	492.6
1.01	6.25	77	6.42	885.	1482.	1170.	492.6
1.01	6.30	78	6.50	696.	1350.	1166.	492.6
1.01	6.35	79	6.58	553.	1211.	1162.	492.5
1.01	6.40	80	6.67	452.	1075.	1157.	492.5
1.01	6.45	81	6.75	375.	949.	1153.	492.4
1.01	6.50	82	6.83	316.	833.	1149.	492.4
1.01	6.55	83	6.92	271.	730.	1146.	492.4
1.01	7.00	84	7.00	236.	639.	1143.	492.3
1.01	7.05	85	7.08	209.	567.	1140.	492.3
1.01	7.10	86	7.17	189.	535.	1138.	492.3
1.01	7.15	87	7.25	172.	504.	1136.	492.2
1.01	7.20	88	7.33	158.	474.	1134.	492.2
1.01	7.25	89	7.42	146.	446.	1131.	492.2
1.01	7.30	90	7.50	136.	419.	1129.	492.2

PEAK OUTFLOW IS 5735. AT TIME 4.08 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5735.	1615.	1293.	1293.	116350.
CMS	162.	46.	37.	37.	3295.
INCHES		11.83	11.84	11.84	11.84
PR		300.54	300.65	300.65	300.65
AC-FT		801.	801.	801.	801.
THOUS CU M		988.	988.	988.	988.

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1.00	RATIOS APPLIED TO FLOWS .10	.25	.50
HYDROGRAPH AT	A1	.20	1	790.	6.	22.	190.
		(.52)		(22.37)(	.17)(	.62)(	5.38)(
HYDROGRAPH AT	A2	.09	1	954.	95.	239.	477.
		(.23)		(27.02)(	2.70)(	6.75)(	13.51)(
2 COMBINED	A3	.29	1	1634.	100.	247.	592.
		(.75)		(46.27)(	2.84)(	6.98)(	16.76)(
ROUTED TO	A4	.29	1	1047.	4.	28.	252.
		(.75)		(29.66)(	.11)(	.78)(	7.15)(
HYDROGRAPH AT	A5	.08	1	634.	63.	159.	317.
		(.21)		(17.96)(	1.80)(	4.49)(	8.98)(
2 COMBINED	A6	.37	1	1665.	66.	164.	535.
		(.96)		(47.14)(	1.86)	4.65)(	14.58)(
ROUTED TO	A7	.37	1	1483.	24.	86.	362.
		(.96)		(41.99)(	.68)	2.43)(	10.24)(
ROUTED TO	A8	.37	1	1105.	18.	64.	272.
		(.96)		(31.28)(	.52)(	1.81)(	7.71)(
HYDROGRAPH AT	A9	.90	1	6295.	629.	1574.	3147.
		(2.33)		(178.25)(	17.82)(	44.56)(	89.12)(
2 COMBINED	A10	1.27	1	6992.	630.	1609.	3257.
		(3.29)		(198.00)(	17.85)(	45.56)(	92.23)(
ROUTED TO	A11	1.27	1	5735.	17.	76.	1211.
		(3.29)		(162.40)(	.49)(	2.14)(	34.29)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	489.10	489.00	491.50
STORAGE	1044.	835.	1065.
OUTFLOW	1.	0.	50.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	493.54	2.04	1260.	5735.	4.67	4.08	0.00
.50	492.52	1.02	1162.	1211.	3.67	4.75	0.00
.25	491.99	0.49	1095.	761.	1.50	5.83	0.00
.10	490.08	0.00	935.	17.	0.00	7.08	0.00

APPENDIX 4

REFERENCE

WILDWOOD LAKE DAM

AD-A087 635 NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/G 13/13
NATIONAL DAM SAFETY PROGRAM. WILDWOOD LAKE DAM (NJ00562), PASSA--ETC(U)
FEB 80 W A GUINAN DACW61-79-C-0011

UNCLASSIFIED NL

2 of 3

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APPENDIX 4

REFERENCES

WILDWOOD LAKE DAM

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